Crisis in Context: The End of the Late Bronze Age in the Eastern Mediterranean

Article *in* American Journal of Archaeology · January 2016

DOI: 10.3764/aja.120.1.0099

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Crisis in Context: The End of the Late Bronze Age in the Eastern Mediterranean

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Explanations for the Late Bronze Age crisis and collapse in the eastern Mediterranean are legion: migrations, predations by external forces, political struggles within dominant polities or system collapse among them, inequalities between centers and peripheries, climatic change and natural disasters, disease/plague. There has never been any overarching explanation to account for all the changes within and beyond the eastern Mediterranean, some of which occurred at different times from the mid to late 13th throughout the 12th centuries B.C.E. The ambiguity of the evidence—material, textual, climatic, chronological—and the differing contexts involved across the central-eastern Mediterranean make it difficult to disentangle background noise from boundary conditions and to distinguish cause from effect. Can we identify the protagonists of the crisis and related events? How useful are recent explanations that focus on climate and/or chronology in providing a better understanding of the crisis? This article reviews the current state of the archaeological and historical evidence and considers the coherence of climatic explanations and overprecise chronologies in attempting to place the "crisis" in context. There is no final solution: the human-induced Late Bronze Age "collapse" presents multiple material, social, and cultural realities that demand continuing, and collaborative, archaeological, historical, and scientific attention and interpretation.[1]

INTRODUCTION

Over the years, the Late Bronze Age "crisis" or "collapse" in the eastern Mediterranean has presented archaeologists and ancient historians with endless fodder for consumption, consideration, and speculation. This horizon of change typically has assumed considerable historical significance—the end of a long-standing high-culture era of interregional connectivity followed by major reorientations, change, and decline—as evident from the titles of books like *The Crisis Years* or the recently published *1177 B.C.: The Year Civilization Collapsed*.[2] Cline's *1177 B.C.*, like the present study, seeks to explain the complexities that brought an end to the Late Bronze Age in the eastern Mediterranean. Thus, there are inevitable overlaps between our work and his in the types and range of data presented, but not in the way they are presented, nor in the readership for whom they are intended.[3] The present study aims to

American Journal of Archaeology
Volume 120, Number 1
January 2016
Pages 99–149
DOI: 10.3764/aja.120.1.0099

www.ajaonline.org

[1] We thank Julia Gruhot for assistance converting references to *AJA* format, and Luke Sollars for preparing fig. 7. We hope that readers will join the discussion on AJA Online (www.ajaonline.org).

[2] Ward and Joukowsky 1992; Cline 2014.

[3] The precise dates (including the title) of Cline's volume are really best guesses from a limited set of viable radiocarbon dates, a few anchor points in documentary sources, and circular reasoning, all of which give his narrative an exactitude in sequences and correspondences too smoothly linked for comfort. His reading of the documentary record is commendable, but the discussion of "natural causes" is inadequate and, as ever, inconclusive.

present more expository, up-to-date treatments of the archaeological data and historical evidence and, crucially, more nuanced, detailed, and critical assessments of the relevant climatological and chronological evidence.

As for any period of major collapse at any time in world history, the causes postulated are legion and mainly logical and seem to change along with changing times:[4] migrations and their aftermath, predations by external forces (the Sea Peoples), political struggles within the dominant polities or system collapse among them, inequalities between centers and peripheries, climatic change and/or natural disasters, disease/plague, the coming Age of Iron.[5] Among them all, we should not expect to find any agreed-upon, overarching explanation that could account for all the changes within and beyond the eastern Mediterranean, some of which occurred at different times over nearly a century and a half, from the mid to late 13th throughout the 12th centuries B.C.E. The ambiguity of all the relevant but highly complex evidence—material, textual, climatic, chronological—and the very different contexts and environments in which events and human actions occurred, make it difficult to sort out what was cause and what was result. Furthermore, we must expect a complicated and multifaceted rather than simple explanatory framework. Even if, for example, the evidence shows that there is (in part) a relevant significant climate trigger, it remains the case that the immediate causes of the destructions are primarily human, and so a range of linking processes must be articulated to form any satisfactory account.

Is it possible to identify the agents or protagonists of the crisis and related events? How valid are recent explanations that focus on climate or claim precise chronological resolution in producing a better understanding of the onset or outcome of the crisis? This article reviews the current state of the archaeological and historical evidence, assesses the relationship between science and archaeology, and considers the coherence of climatic explanations as well as new chronological data, all in the attempt to place the crisis in context. We proceed first by considering the climatic evidence and that of natural disasters (mainly earthquakes), the focus of much recent research that must also be seen as part of the ostensibly "difficult liaison" between science and archaeology. We then evaluate recent radiocarbon evidence and the absolute chronology of the period. This is followed by presentation of a broad selection of the available documentary evidence (Egyptian, Hittite, Ugaritic, Akkadian) from the eastern Mediterranean that bears some witness to the overall situation. Finally, we turn to the most complex evidence, that of archaeology, where it is impossible to be anything other than selective: coordinating even in the roughest relative chronological framework a series of destructions and abandonments over an area of some 6 million km^2 (i.e., from Greece in the west through the borders of Mesopotamia in the east; from Anatolia in the north to Egypt in the south) is an impossible task for any scholar, or even two scholars. We then attempt to place all these patterns, processes, protagonists, and events into context, but there is no final solution. Our interim interpretation remains subject to the vagaries and reporting of ongoing archaeological fieldwork and urges closer archaeological and scientific attention and collaboration.

SCIENCE AND ARCHAEOLOGY: A DIFFICULT LIAISON

Speaking of "the loss of scientific credibility in archaeology," Kristiansen recently observed, "archaeology and the humanities in general have abstained from the big questions that concern most people such as the relationship between climate, culture and environment, which demands grand historical narratives."[6] If archaeology generally has left many of the "big questions" to natural scientists, at least some archaeologists recently have taken up the challenge to engage with grander prehistorical narratives: among these works are Broodbank's *The Making of the Middle Sea* and Robb and Pauketat's *Big Histories, Human Lives*,[7] as well as Mithen's *After the Ice: A Global Human History, 20,000–5000 B.C.* and Gamble's *Origins and Revolutions: Human Identity in Earliest Prehistory*.[8] Moreover, among the "25 grand challenges for archaeology" discussed in a recent issue of *American Antiquity*,[9] the

[4] As Silberman (1998) noted with respect to the "Sea Peoples."

[5] We discuss a number of hypotheses below. For literature offering a range of scenarios, syntheses, and previous discussions (and references to other literature), see, e.g., Weiss 1982; Liverani 1987; Sandars 1987; Ward and Joukowsky 1992; Drews 1993; Walløe 1999; Nur and Cline 2000; Dickinson 2006; Bachhuber and Roberts 2009; Yasur-Landau 2010; Cline 2014; Middleton 2015.

[6] Kristiansen 2011, 77.

[7] Broodbank 2013; Robb and Pauketat 2013.

[8] Mithen 2003; Gamble 2007.

[9] Kintigh et al. 2014.

last two are (1) how do humans respond to abrupt environmental change? and (2) how do humans perceive and react to changes in climate and the natural environment over short and long terms? The relationships among climate, culture, and environment seem to have regained real prominence in world archaeology in these first decades of the 21st century.

Middleton maintains rightly that the increasing availability and sophistication of paleoenvironmental data—together with contemporary concerns over sustainability as well as climate change and the ways that humans affect their environment—have led archaeologists or ancient historians to take more seriously what would once have been dismissed out of hand as overly deterministic views of change in human societies.[10] Nonetheless, many discourses generated by recent paleoclimatic data published in archaeological as well as social and physical science journals tend to view the complex phenomenon of cultural change or collapse as largely or even essentially an environmental phenomenon (e.g., note the critique by Wengrow et al. of postulating climate and environmental stress as drivers of cultural adaptation in the fifth-millennium B.C.E. Nile Valley).[11] More nuanced assessments tend to come from later periods (e.g., Roman to post-Roman), where substantial historical evidence forces consideration and discussion of overall more complex and dynamic sets of relationships.[12] And, inevitably, as debate enters historical periods, there have been strong reactions against what are perceived as overly simplistic or inadequately robust climate-driven hypotheses.[13]

How are archaeologists and historians meant to engage with this escalating scale of scientific evidence? In turn, to what extent do scientists need to comprehend the depth and complexity of archaeological or historical research and theory? Just as archaeologists may lack the expertise or background to evaluate complex scientific data sets and (statistical) analyses,[14] so, too, scientists may misrepresent or misunderstand the specialized views and arguments of historians and archaeologists. Some recent scientific literature, and in particular that which is critiqued here, tends to perpetuate discredited or controversial accounts of archaeological and historical instances of change, not least poorly substantiated notions of climate-driven mass migrations rooted in origin myths or, in the present case, ancient documentary evidence written by and for an elite class with specific political or ideological agendas. The potential historical complexities of even supposedly well-known cases—such as the documentary accounts of famine from the First Intermediate Period of Egypt, which, however, may not necessarily be literal accounts[15]—are instructive caveats to any naive use of textually based claims. Those unfamiliar with the contested nature of archaeology might be forgiven for misconstruing the transient nature of archaeological or historical reasoning—for example, where the explanation of a specific event or postulated social process may be modified, change entirely, or disappear altogether when new data become available, or when existing evidence is contested, reconsidered, or reinterpreted.[16]

One further problem is the intractability of both archaeologists and scientists who embrace a predetermined position.[17] When any scholar defends the correctness or appropriateness of a singular point of view, or set of data, everything else tends to be analyzed accordingly—alternative views are intensely criticized, dismissed, or ignored entirely, while complementary views or evidence are presented with little critical reflection.[18] Whether the evidence is archaeological or scientific, often it is only partial or ambiguous and so becomes easy to interpret or manipulate in a manner that serves to perpetuate a preconceived idea or point of view. The outcome is often a selective filtering of data and related information and an unwillingness to contemplate or envisage a counter position. The realm of science and archaeology, or science in archaeology, is necessarily and by definition interdisciplinary, and as one of us has noted, "It is difficult or impossible to be expert in all areas, and difficult to be even handed to all evidence and to judge and criticise it appropriately on its merits."[19] But we have to accept, and agree, that specific kinds of expertise are crucial if we wish to present credible or even debatable arguments or opinions.

To return, then, to one final point from Kristiansen, more directly relevant to the topic at hand: "[T]here

[10] Middleton 2012, 258.

[11] Wengrow et al. 2014.

[12] E.g., White 2011; McCormick et al. 2012; Manning 2013; Raphael 2013; Haldon et al. 2014. See also the rather more polemical argument in Ellenblum 2012.

[13] See, e.g., Kelly and Ó Gráda 2014 (and the literature cited).

[14] E.g., Pernicka 2014, 263.

[15] E.g., Seidlmayer 2000; Moeller 2005.

[16] Middleton 2012, 269.

[17] Manning 2007, 101–2.

[18] E.g., Karageorghis 2013.

[19] Manning 2007, 102.

is much to suggest that recent innovations in DNA analysis, strontium isotope analysis, and *climate research*, are about to change the focus and direction of much archaeological research towards larger more global problems, even when studied in a local or regional context."[20]

When we turn to consider just one of those regional contexts, the eastern Mediterranean at the end of the Late Bronze Age, several scholars and research groups are now attempting to assess the extent to which climatic factors or catastrophic natural events caused or contributed to the demise of a nearly 300-year-long era of prosperous interregional contacts, communications, and exchange. How can we evaluate all this new environmental research?

(PALEO-)CLIMATE, DROUGHT, AND FAMINE

> . . . we have now entered a new historical phase in terms of the two-way relationship existing between climate and humankind.[21]

In recent years, there has been a resurgence of research examining the potential causal role of climate and environment in culture change.[22] An increasing awareness of climatic change, global environmental change, and sustainability has led scholars, scientists, and politicians to develop and promote formal or informal programs, working groups, and think tanks to study in depth human-environmental relations—past and present—and their implications for sustainability.[23] Contemporary concerns over changing climatic conditions have tended to focus on two regions that seem most vulnerable: the Arctic and low-lying islands or coastal areas worldwide.[24] Even so, with a battery of new scientific techniques, analytical equipment, and computing capacity, global attention increasingly is directed to studying the origins and outcomes of climatic change anywhere in the world. Paleoenvironmental and historical research supported by an array of international science programs seeks to isolate and identify the dynamics that stimulate social adaptations to climatic and environmental changes, in order to gain some insights into the resilience of past societies that might be of value in adjusting the outlook and planning of contemporary and future societies. Inevitably, then, much ongoing and developing research is increasingly devoted to the study of past climate change.

In this context, it is not surprising that various scholars or research groups now seek to explain the demise of the international era of trade and connectivity in the Late Bronze Age eastern Mediterranean by looking at climatic factors or catastrophic natural events. Although much research along these lines was conducted during the 1960s–1980s,[25] it then went out of fashion until the recent resurgence in interest.[26] Foremost among current scholars or groups involved are David Kaniewski (University of Toulouse) and a team of Belgian and French colleagues, including, in some of their papers, an archaeologist and/or a philologist. Basing their work on geomorphology, sedimentology, pollen analyses, and radiocarbon dating, this group has tended to make rather sweeping cultural conclusions. This is a common problem observed in other recent studies that try to find some basic connections of climate to history concerning later periods;[27] the issues, however, are invariably complex and multifaceted.[28] While the methodological apparatus certainly seems credible in general, one inherent problem in all these studies is that proposition or supposition rapidly turns into fact without an adequate intervening argument; another—in work to date—is that the temporal resolution is rather less robust and precise than suggested.

For example, in one of their earlier and more carefully argued papers, Kaniewski et al. used two geomorphological cores and 83 sediment samples from which another 83 samples were prepared for pollen analyses. From these samples they derived climatic proxy data. Based on those data, together with four radiocarbon dates from one core and three (used) radiocarbon dates from the other core (all on charcoal with possible in-built age issues), as well as stratified excavation data from the Syrian coastal site of Tell Tweini (ancient Gibala?), they concluded, "The abrupt climate change

[20] Kristiansen 2011, 78 (emphasis added).

[21] Kempf 2012, 218.

[22] Sandweiss and Kelley 2012, 371–72. An earlier phase is represented by Lamb's (e.g., 1965) pioneering work, now rather overlooked, which sought to make climate changes relevant to history.

[23] Butzer and Endfield 2012, 3628.

[24] Van de Noort 2013; Orlove et al. 2014.

[25] Carpenter 1966; Bryson et al. 1974; Weiss 1982; Shrimpton 1987.

[26] A paper by DeMenocal (2001) marked the prominent return of climate change as relevant both to past societal change and to future human-climate understanding.

[27] E.g., Haug et al. 2003; Büntgen et al. 2011.

[28] For the Roman to Late Roman case, see McCormick et al. 2012; Manning 2013.

at the end of the Late Bronze Age caused region-wide crop failures, leading towards socio-economic crises and unsustainability, forcing regional habitat-tracking" (people moving out of areas under climatic or other environmental stress into areas that could still sustain agriculture).[29] While not implausible, the chronological resolution is inadequate to support the precise historical argument.

The sparse set of dates used by Kaniewski et al.[30]—if modeled at 1 cm resolution using a realistic variable deposition rate Age-Depth model (variable *k* of 1 cm and allowing for up to two orders of magnitude variation) and the Charcoal Outlier model (to allow for in-built age) in OxCal (fig. 1)[31]—indicates only a very coarse resolution sediment sequence for core TW-1. It must also be emphasized that the modeled date range for the key sample (TWE04 EP57 [Beta-229048]), dating the "last peak of the wetter phase preceding the onset of the drought event,"[32] while centering around 1200 B.C.E., is in fact resolved, at best, to fairly low resolution at 119- or 205-year inclusive ranges (1278–1160 B.C.E. and 1310–1106 B.C.E.). Even then, this takes into account only the 64.4% and 83.6% most likely subsets of the respective 68.2% and 95.4% ranges (while slightly different and narrower than the most likely nonmodeled subset ranges from the original 68.2% and 95.4% ranges at 1234–1124 B.C.E. [61.6%] and 1297–1051 B.C.E. [94.2%]). This is loose dating—within one or two centuries, at best—and hardly the basis for a refined historical reconstruction. As we shall see, however, as of 2014 this is in fact the most successful such paleoclimatic dating for the end of the Late Bronze Age in the eastern Mediterranean.

In a follow-up paper in the online journal *PLOS ONE*, now using eight radiocarbon dates (on charred seeds as well as charcoal) from Tell Tweini and further discussion of destruction levels at the site (which are nearly contemporaneous with those at Ugarit, some 40 km north), Kaniewski et al. provide a spuriously precise calibrated radiocarbon chronology for the Levant and Egypt, to which they add dates from the Aegean and Anatolia that correspond with their argument.[33] The authors use a weighted average from the eight dates, which cover a fair spread of time (fig. 2), and then argue for selection of a very precise range within the possible calibrated age ranges. In fact, an exponential (Tau_Boundary) model is likely more appropriate because it assumes all the radiocarbon-dated samples are older than the level 7D destruction (most of them are, but not by much).[34] This means that dates on any individual residual samples, or individual samples older for some other reason, do not lead to an overestimation of the date. If we conduct the analysis this way (see fig. 2), the most likely 68.2% range (1182–1111 B.C.E.) does not even include the proposed overly precise date of Kaniewski et al. at 1194–1190 B.C.E.,[35] which rather undermines the entire argument based on a supposed but nonexistent high-resolution dating and correlation. Otherwise, a reduced but very similar version of the methodology and archaeological-historical data from the 2010 article makes up the rest of the article.

More recently, in another *PLOS ONE* paper, Kaniewski et al. add paleoclimatic data from Cyprus for the end of the Late Bronze Age crisis, producing another pollen-derived climatological sequence from a new core (taken from the salt lake at Hala Sultan Tekke) and another radiocarbon-based chronology integrating archaeological and paleoclimatic proxies.[36] The key new Cypriot core is represented by just three radiocarbon dates and could be described, at best, as very coarsely dated (see the Age-Depth model in fig. 3); the stated single-year intercept dates are clearly inappropriate.[37] The key period from ca. 1300 B.C.E. onward in particular, the focus of the paper, is effectively not dated with any meaningful degree of resolution (see fig. 3). This situation once again inherently undermines the high-resolution claim. Nonetheless, the authors state that, in combination, these data reveal the effects of "abrupt climate change-driven famine

[29] Kaniewski et al. 2010, 207.

[30] Kaniewski et al. 2010, tables 1, 2.

[31] Bronk Ramsey 2008, 2009a; Bronk Ramsey and Lee 2013. Specifically, the Age-Depth models in our figs. 1, 3, and 6 use the Poisson process, P_Sequence, function of OxCal (Bronk Ramsey 2008) and apply the Charcoal-Outlier model (Bronk Ramsey 2009b) with a variable *k* model at 1 cm resolution, interpolating 1 cm depths (Bronk Ramsey and Lee 2013), and the IntCal13 radiocarbon calibration data set (Reimer et al. 2013) with curve resolution set at 5 years. In the plots, the modeled calendar age probabilities are shown in the solid/dark histograms and the nonmodeled probabilities in light/hollow histograms. The upper and lower lines underneath the probability histograms indicate the 68.2% and 95.4% probability ranges, respectively.

[32] Kaniewski et al. 2010, 210.

[33] Kaniewski et al. 2011, 8 June.

[34] Bronk Ramsey 2009b.

[35] Kaniewski et al. 2011, 8 June.

[36] Kaniewski et al. 2013, 14 August.

[37] Kaniewski et al. 2013, 14 August, table 1.

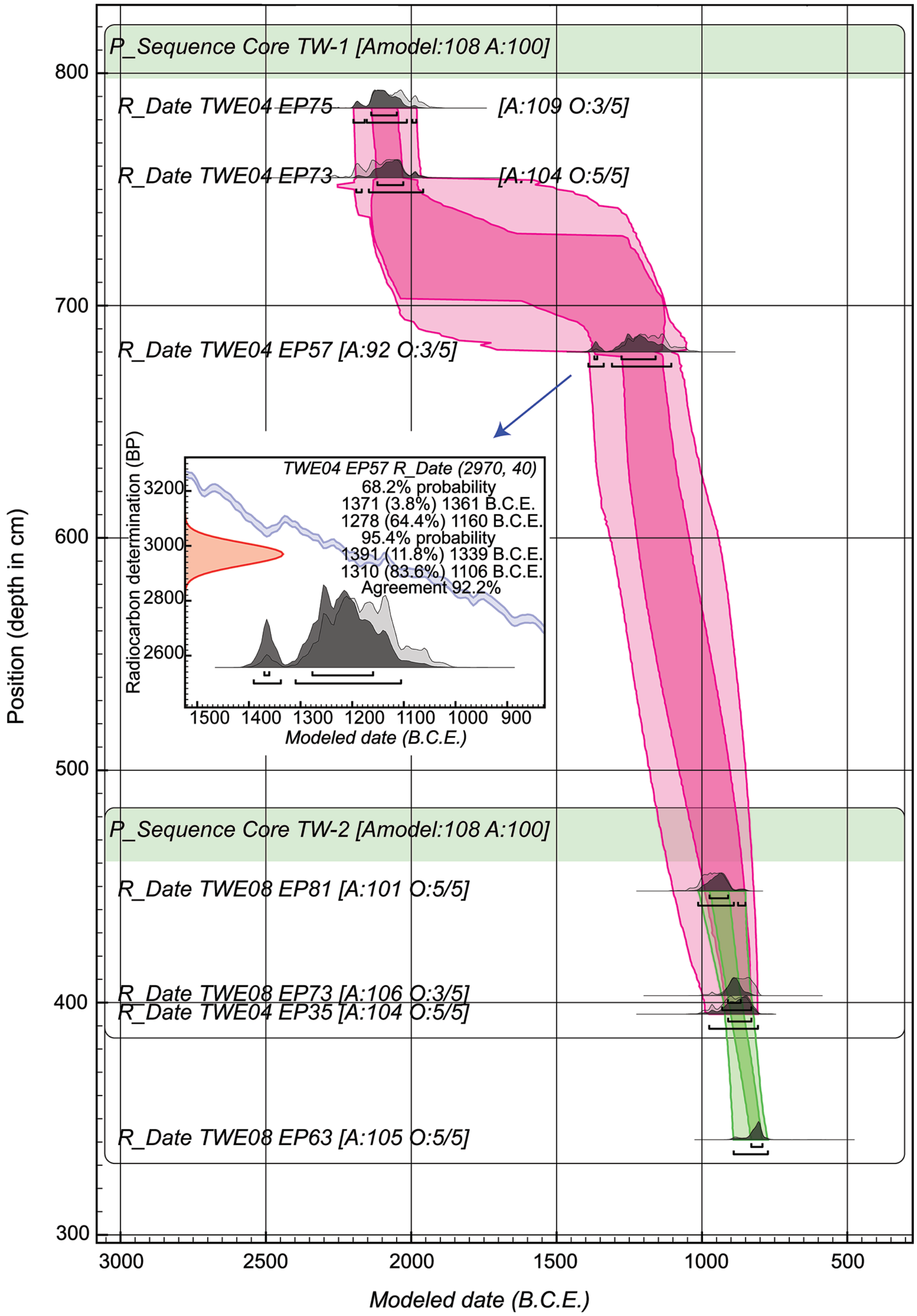

FIG. 1. Age-Depth models for the radiocarbon dates on charcoal samples from cores TW-1 and TW-2 in Kaniewski et al. 2010 (see n. 31 herein for methods). The modeled ages for the dates are shown. The TW-1 Age-Depth model at 68.2% probability is shown in dark magenta and the 95.4% probability range in light magenta; the TW-2 Age-Depth model at 68.2% probability is in dark green and the 95.4% probability range in light green. The inset shows the modeled calendar probability (dark-gray histogram) vs. non-modeled probability distribution (light-gray histogram) and the modeled 68.2% and 95.4% probability ranges for core TW-1 sample TWE04 EP57 (Beta-229048). The red curve shows the individual date's radiocarbon age Gaussian probability distribution, which is then transformed into a calibrated calendar age probability distribution (light-gray histogram) via the intersection with the IntCal13 radiocarbon calibration data set shown at 1 SD by the blue curve. The dark-gray histogram shows the modeled calendar probability distribution given the overall Bayesian model. Models created using OxCal 4.2.3 (Bronk Ramsey 2009b, 2013) and the IntCal13 atmospheric curve, with curve resolution set at 5 (Reimer et al. 2013).

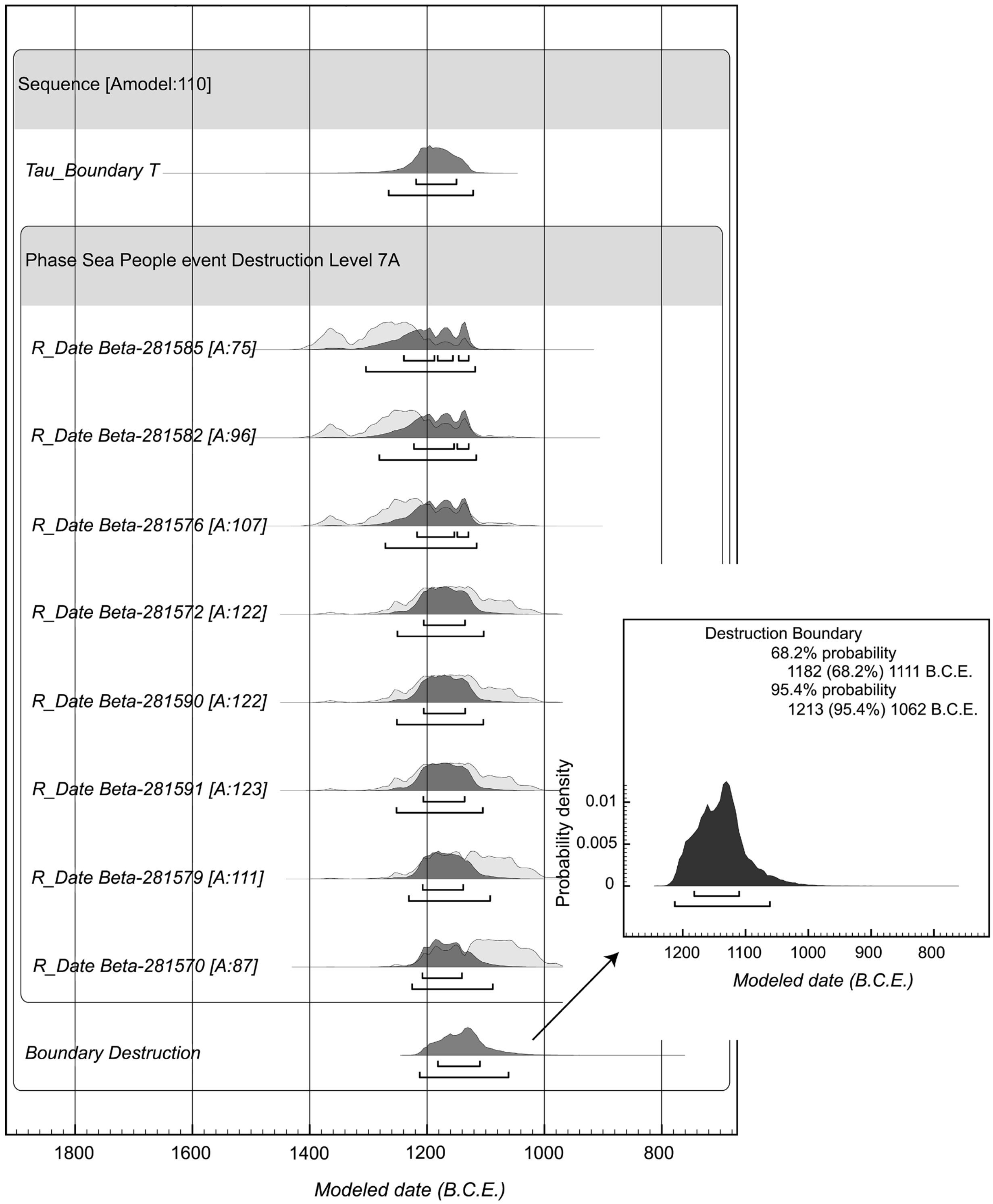

FIG. 2. Model of the set of radiocarbon dates on short-lived samples from the claimed "Sea Peoples" destruction of level 7A at Tell Tweini (Kaniewski et al. 2011, 8 June), employing a Tau_Boundary paired with a Boundary model to create an exponential distribution toward the end of the phase, using OxCal 4.2.3 (Bronk Ramsey 2009b, 2013) and IntCal13 (Reimer et al. 2013), with curve resolution set at 5. The inset shows the end boundary for the set: the best estimate for the level 7A destruction (see text).

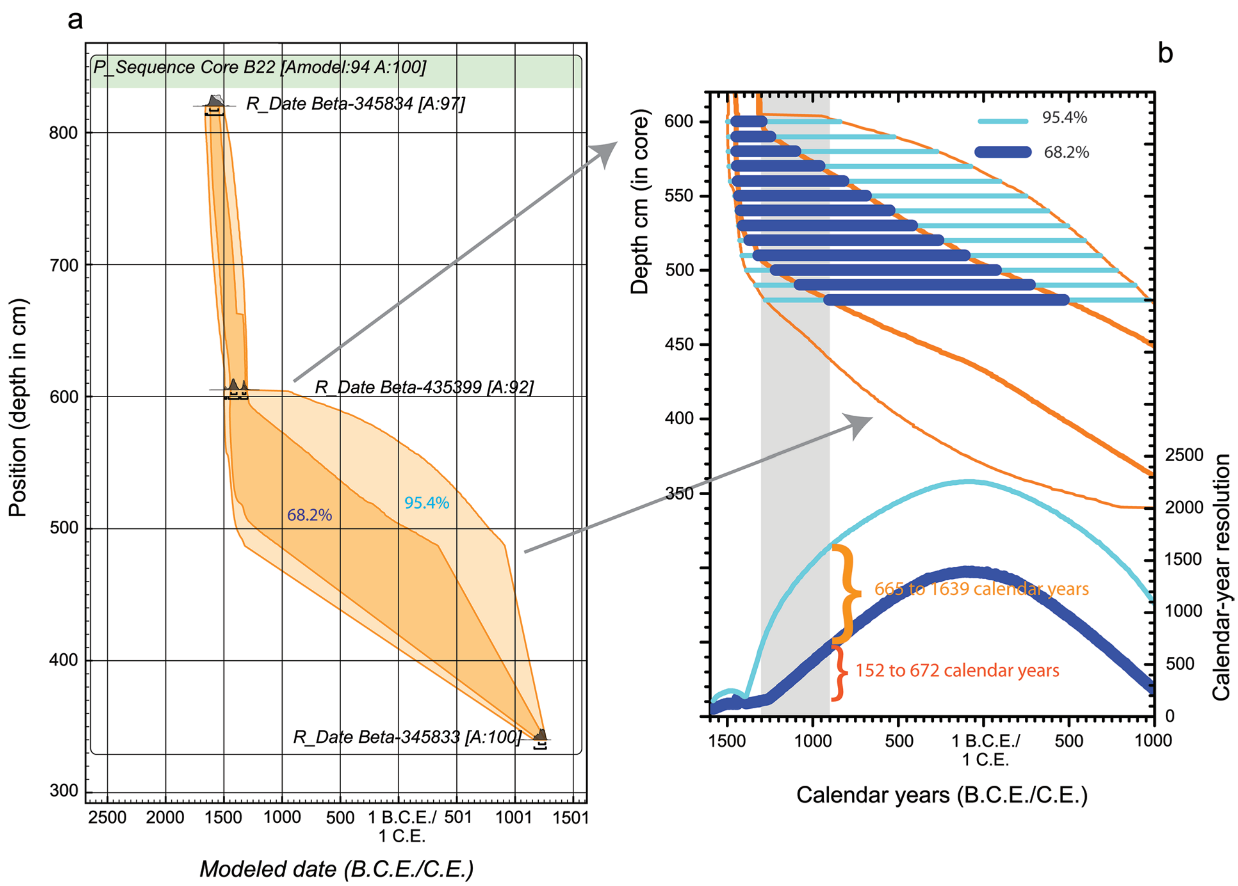

FIG. 3. Review of the real accuracy and precision of dating of the Cyprus B22 core in Kaniewski et al. 2013, 14 August: *a*, Age-Depth model for the three radiocarbon dates stated to be on short-lived samples from the Cyprus B22 core in Kaniewski et al. 2013, 14 August (see n. 31 herein for methods). The Age-Depth model at 68.2% probability is dark orange, and the 95.4% probability range is light orange. Note the very low resolution available in the two millennia after 1300 B.C.E.; *b* (*top*), the poorly resolved 68.2% and 95.4% calendar date ranges for core depths covering ca. 1300–900 B.C.E. (gray highlighted area) from part *a*; *b* (*bottom*), the low calendar-year resolutions quantified for 1600 B.C.E. to 1000 C.E. from part *a*. Models created using OxCal 4.2.3 (Bronk Ramsey 2009b, 2013) and the IntCal13 atmospheric curve, with curve resolution set at 5 (Reimer et al. 2013).

and causal linkage with the Sea People invasions in Cyprus and Syria." Furthermore, the authors claim that "statistical analysis of proximate and ultimate features of the sequential collapse reveals the relationships of climate-driven famine, sea-borne-invasion, region-wide warfare, and politico-economic collapse, in whose wake new societies and new ideologies were created." We also read that "[r]educed precipitation probably affected the outlying nomad habitats, and led rain-fed cereal agriculturalists to habitat-tracking when agro-innovations are [sc. were] not available."[38]

First of all, the term "outlying nomad habitats" makes no sense in the Cypriot context. Secondly, after presenting further scientific data and statistical analyses in a severely truncated manner, Kaniewski et al. conclude that the Larnaca Salt Lake must have been a "sheltered marine embayment"[39] during the first part of the Late Bronze Age but that a shift to a "lagoonal environment" occurred sometime between ca. 1450 and 1350 B.C.E. The authors maintain that this was a time "concomitant with the decreasing prosperity of the Hala Sultan Tekke harbour."[40] The archaeological record of the Vyzakia site, however, reveals no loss of prosperity until its final abandonment at the

[38] Kaniewski et al. 2013, 14 August, 1–2.

[39] As known already from earlier work (Gifford 1985, 47–8; Blue 1997, 32–4).

[40] Kaniewski et al. 2013, 14 August, 3.

end of the 13th century B.C.E.; indeed, there seems to be evidence for such a stage in the core as well. The authors also cite marine, oxygen isotope, vegetation, and other paleoclimatic data from the eastern Mediterranean (Ashdod coast, Soreq Cave, the Dead Sea, and the Nile, Tigris, and Euphrates River discharges) to argue for "hydrologic instability and the extended drought attested in Cyprus during the Late Bronze Age crisis."[41] Although periodic drought on Cyprus is indisputable,[42] none has ever been postulated for the 13th–12th centuries B.C.E.[43] The authors go on to discuss Late Cypriot (LC) IIC–IIIA destructions by the Sea Peoples on Cyprus,[44] coupled with the same Tell Tweini evidence presented in their earlier studies, including the same Sea Peoples' "radiocarbon chronology," to argue that the crisis at the end of the Late Bronze Age, the raids of the Sea Peoples, and the onset of widespread regional drought are "the same event." They conclude that the Late Bronze Age crisis coincided with the onset of a 300-year-long drought event that "caused crop failures, dearth and famine, which precipitated or hastened socio-economic crises and forced regional human migrations at the end of the LBA in the Eastern Mediterranean and southwest Asia."[45] Other recent paleoclimatic-based arguments for this proposed drought are presented below.

Given the nature of these publications, Kaniewski is rather surprisingly quoted (in an online discussion) as expressing the view that paleoclimatologists have perhaps been too quick "to couple climatic and human events," which has led many archaeologists to treat climatic data "as simplistic, just because it failed, in their minds, to adequately consider and make enough room for the social and political context." He also suggests, sensibly, that archaeologists and paleoclimatologists should work together more closely "to study coupled natural and social systems,"[46] but it is hard to see that he has put his own suggestion into practice.

For Kaniewski and his collaborators, their interpretation of environmental and climatological data—published in three articles over a period of three years and stemming from their multipronged approach—apparently has resolved the issue. In our view, however, this is a premature and only a proposed resolution of the issue: in fact, it represents the beginning, not the end, of the research process. Certainly we need to proceed, but to do so more cautiously, with greater chronological control, showing some concern not only with the wider archaeological and documentary records but also with the opinions of those who have been working on all the relevant materials in the various lands and regions involved. After all, this isn't the first time that archaeologists and/or scientists have tried to address this problem.

Almost 50 years ago, Carpenter sought to explain the demise of Mycenaean culture and the Hittite state ca. 1200 B.C.E. as the result of climatic factors, in particular a limited-term drought and subsequent famine at the end of the Late Bronze Age.[47] This notion was developed further by Weiss to consider the widespread decline and disappearance of what we might term palatial cultures in the eastern Mediterranean around the end of the Late Bronze Age.[48] Let us take a closer look at the contributions of these earlier scholars, one an ancient historian, the other a well-informed paleoclimatologist of the time.[49]

Carpenter argued that the evident decline in the Aegean and Anatolia and migrations into and out of Greece and out of the central Anatolian plateau in the late 13th century B.C.E. were caused by a drought event; the incursion of Dorian tribes from the north into Greece occurred at least a century later.[50] He reasoned that the documented destruction levels or abandonments on the Greek mainland (and the relative paucity of foreign elements at all sites), as well as the movement of the Hittites into northern Syria, were inconsistent with the notion of an invasion. Instead, he argued that a prolonged drought resulted in a disastrous famine and eventually a redistribution of people during the late 13th to 12th centuries B.C.E. from places that had become warmer and drier than in the previous centuries to regions where it was cooler and wetter than before (i.e., "habitat tracking"). Ironically, in contrast to the recent work of Kaniewski et al.,

[41] Kaniewski et al. 2013, 14 August, 6.
[42] As evident, at intervals, in the recent period (Griggs et al. 2014).
[43] Iacovou 2013a, 19–24.
[44] Cf. Muhly 1984, 45–51.
[45] Kaniewski et al. 2013, 14 August, 9.
[46] Conniff 2012.
[47] Carpenter 1966.
[48] Weiss 1982.
[49] Kuniholm (1990), a dendrochronological specialist, cautiously supported the notions of Carpenter (1966) and Weiss (1982).
[50] Carpenter 1966.

the main criticisms of Carpenter's hypotheses came at the time from the science side.[51]

Based on a Ph.D. thesis by Donley, which first examined the modern climatic record by empirical eigenvector analysis for a spatial drought pattern consistent with the proposed Late Bronze Age population shifts in Greece, Bryson et al. found that the circulation pattern for the winter of 1954–1955 was consistent with that assumed for the drought event in the Aegean and with climatic conditions assumed for other nearby regions at that time.[52] Weiss hypothesized that drought led to Luwian peoples migrating from western Anatolia early in the 12th century B.C.E., which was somehow to be associated with the movements of the Sea Peoples and their incursion into Egypt during the reign of Ramesses III, as well as their settlement along the Levantine coast, whence they filtered into northern Syria and the upper Euphrates region.[53] Weiss' argument, like that of Donley and Bryson et al. before him, hinges on the belief that past climatic patterns recur today but with different frequencies.[54] To establish the existence of a drought analogous to that at the end of the Late Bronze Age, Weiss examined temperature and precipitation records from 35 Greek, Turkish, Cypriot, and Syrian weather stations for the period 1951–1976.[55] He then established a "drought index" (Palmer), which measures the severity of drought, for each of these stations over the periods on record, and because of local weather regimes he also examined drought indices for the winter months with eigenvector analysis. Accordingly, he determined that a drought pattern consistent with the postulated population movements in Anatolia had been the dominant pattern in January 1972.

Weiss' study, impressive some 30 years ago, suffers from the sort of freewheeling "historical" interpretation (e.g., assigning various groups of the "Sea Peoples" to specific regions in the Aegean or Anatolia) that has characterized much research on the end of the Late Bronze Age in the eastern Mediterranean for the last 50 years, research that became canonized by inclusion in various chapters of the third revised edition of the *Cambridge Ancient History*. For example, Weiss suggested that "Greek speakers among the Sea Peoples (e.g. *Akaiwasha*-Achaeans ca. 1232 B.C.E.; *Denyen*-Danaoi, ca. 1191 B.C.E.) no doubt settled in Cyprus at this time and imposed their language on the islanders."[56] His discussion of the situation in Egypt, Cyprus, Ugarit, Hatti, Assyria, and the Aegean is reasonably accurate and based largely on historical records as well as on archaeological destructions that have been tethered to the documentary evidence. In conclusion, Weiss was admirably forthright about the results of his research:[57]

> [W]e have shown little more than that a drought pattern has occurred in modern data with large scale features that more or less satisfy the requirements necessary to drive such a migration scheme as occurred at the end of the Late Bronze Age. This must not be construed as proof that such a pattern dominated climatic conditions of that period of antiquity. Indeed, with data currently at hand no such proof could be forthcoming.

More recently, using paleoclimatic proxy records derived from oxygen-isotope analyses, stable carbon isotopes, sea-surface temperatures, and changes in warm-water species (dinocysts and foraminifera) in Israel, Greece, and the wider Mediterranean, Drake argues that the surface temperatures of the Mediterranean cooled rapidly during the Late Bronze Age (a drop of 2°C between 1350 and 1124 B.C.E.), reducing rainfall over land and limiting the release of freshwater into the atmosphere.[58] In other words, the climate at the onset of the early Iron Age is perceived to have been more arid than it was during the preceding Late Bronze Age. Drake thus suggests that a "gear shift" in Mediterranean climate could have placed continual stress on human societies in this region for several generations, affecting in particular palatial centers dependent on high levels of dryland agricultural productivity.[59] This is more or less in line with the arguments made by Kaniewski et al., but Drake emphasizes that the climate proxies that point to colder Mediterranean sea-surface temperatures and arid conditions are all based on low-resolution data and that it is not possible to pinpoint the time at which the climate became more arid (even if statistical analysis suggests that it occurred before 1250–1197 B.C.E.).[60]

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[51] Wright 1968. While very supportive of the relevance of climate change to history, Lamb (1967) also noted some weaknesses in the scientific case.

[52] Donley 1971; Bryson et al. 1974.

[53] Weiss 1982.

[54] Donley 1971; Bryson et al. 1974.

[55] Weiss 1982, 187, fig. 4.

[56] Weiss 1982, 178–79; cf. Voskos and Knapp 2008.

[57] Weiss 1982, 194.

[58] Drake 2012.

[59] Drake 2012, 1866–67.

[60] Kaniewski et al. 2010; Drake 2012, 1868.

Based on stable isotope ($\delta^{18}O$) records from several lakes, Mediterranean marine cores, and cave speleothems in Lebanon, together with the decline in water levels in the Dead Sea and Tecer Lake in central Anatolia, Roberts et al. also suggest that the Late Bronze Age "collapse" at the end of the second millennium B.C.E. coincided with a period of climatic aridity.[61] This is now a widely held—albeit imprecisely dated—view (see further below). Taking into account the issue of solar variability (fig. 4), Mayewski et al. suggest that a "rapid climate change event" between ca. 1500 and 500 B.C.E. may coincide with a decline in solar output at these times, a so-called Grand Solar Minimum in the mid eighth century B.C.E.[62] An Arctic summer temperature reconstruction likewise shows a change from a temperature peak centered in the 14th century B.C.E. to much lower temperatures from the mid 12th through seventh centuries B.C.E. (see figs. 4, 5).

As noted above, Drake summarizes these and other paleoclimate proxies indicating both more arid and cooler conditions around the later second and early first millennium B.C.E. from the central-eastern Mediterranean.[63] The high-resolution Sofular Cave speleothem from northwest Turkey is another record that indicates a generally more arid trend in the 13th to 10th centuries B.C.E. before a return to moister conditions in the ninth century B.C.E. (see fig. 5).[64] In a more encompassing review of 18 (selected, higher-quality) paleoclimatic proxies, still mostly low resolution, spread over the past 6,000 years and using a suite of dating techniques, Finné et al. also identify more arid conditions in the eastern Mediterranean both before and after the end of the Late Bronze Age.[65] They emphasize, however, that while socioeconomic crises may be closely fixed in time, the proposed climatic information can rarely be resolved adequately. They thus call for improved data sets capable of higher resolution to establish more securely the climatic and paleoenvironmental viewpoints.[66] The situation at the end of the Late Bronze Age stands in stark contrast to the large body of increasingly high(er)-resolution data available for much of the C.E. period in the Mediterranean.[67]

Langgut et al. also document an arid phase at the end of the Late Bronze Age, based on a high-resolution pollen analysis for the Bronze and Iron Ages of a core of sediments drilled from the Sea of Galilee.[68] The authors used a detailed pollen diagram (from 56 palynological samples) to reconstruct past climate changes and human impact on southern Levantine (Mediterranean) vegetation; they based their chronological framework on AMS radiocarbon dating of six samples of short-lived terrestrial organic material. The most severe arid phase they identified, between ca. 1250 and 1100 B.C.E., was based on a significant decrease in Mediterranean (olive and arboreal) tree values, suggesting a reduction in precipitation and the shrinkage of the Mediterranean forest and maquis. The authors maintain that this was a prolonged event (lasting slightly more than a century), "the most pronounced dry episode during the Bronze and Iron Ages," one that resulted from climatic (lowered sea-surface temperatures in the Mediterranean) rather than human-induced change.[69] Despite the close involvement of an archaeologist, the authors' explanation is largely climate-driven: "We believe the domino effect . . .—cold spells, droughts and famine in the north, causing groups to invade sedentary lands in the south—explains the Late Bronze collapse."[70] Pollen data for the Iron I period, evident in the increased percentages of both Mediterranean trees and cultivated olive trees, indicate a "dramatic" recovery following the Late Bronze "dry event." We return below (in the section "The Case for Chronology") to critique Langgut et al.'s study in some detail.

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[61] Roberts et al. 2011.

[62] Mayewski et al. 2004, 251; see also Rohling et al. 2009b.

[63] Alley 2000; see also Cuffey and Clow 1997; Drake 2012, figs. 2–4.

[64] The data in fig. 5, from top to bottom, come from north Spain (Martín-Chivelet et al. 2011); Poleva Cave, Romania (Constantin et al. 2007a; data published in Constantin et al. 2007b); the LC21 marine core (Rohling et al. 2002) showing changes in percent warm to cold foraminifera with timescale following their maximum age correction to match the age of the Santorini eruption (see data in Rohling et al. 2009a); the GISP2 Greenland ice-core modeled summer temperature record (from 4742 BP) with ages approximately corrected following Southon 2004, fig. 3 (cf. uncorrected ages in our fig. 4); Buca della Renella, Italy (Drysdale et al. 2006; see data in Drysdale et al. 2007); Sofular Cave, Turkey (Fleitmann et al. 2009a; see data in Fleitmann et al. 2009b); and Soreq Cave, Israel (Bar-Matthews et al. 2003a; see data in Bar-Matthews et al. 2003b).

[65] Finné et al. 2011, 3162, 3167. For selection criteria of the 18 records, see Finné et al. 2011, 3157–59.

[66] Finné et al. 2011, 3154, 3168.

[67] E.g., Luterbacher et al. 2012.

[68] Langgut et al. 2013.

[69] Langgut et al. 2013, 160.

[70] Langgut et al. 2013, 164, 166–68.

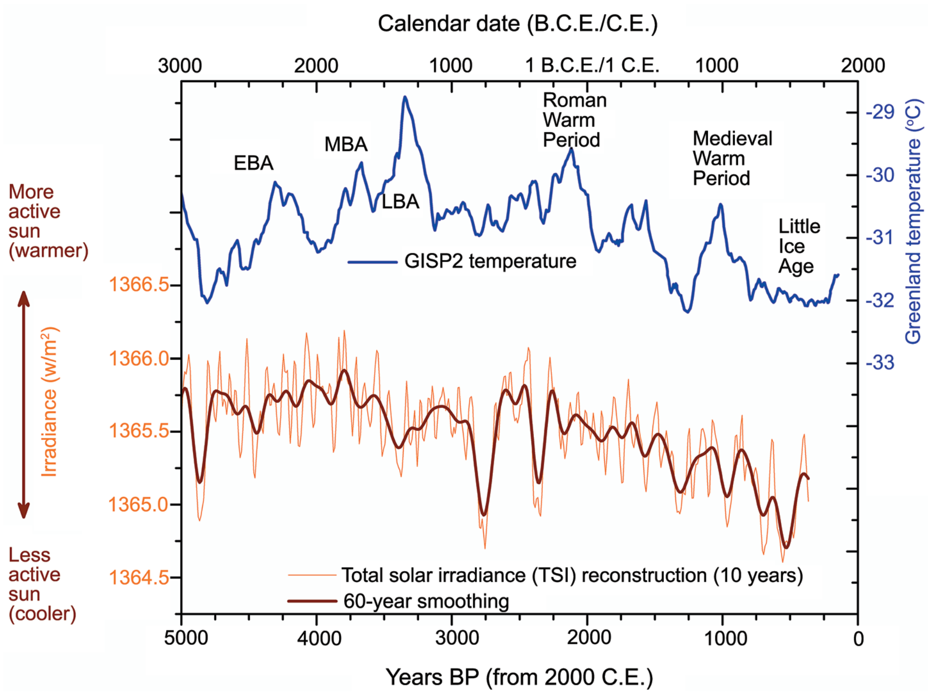

FIG. 4. Northern hemisphere temperature and solar irradiance records: *top*, GISP2 Greenland ice-core modeled summer temperature record for the past 5,000 years (Alley 2000; data in Alley 2004; see also Cuffey and Clow 1997); *bottom*, modeled total solar irradiance (TSI), or solar activity, from the IntCal09 radiocarbon data set for the past 5,000 years (see Vieira et al. 2011a, esp. table 4, which relies on data published in Vieira et al. 2011b).

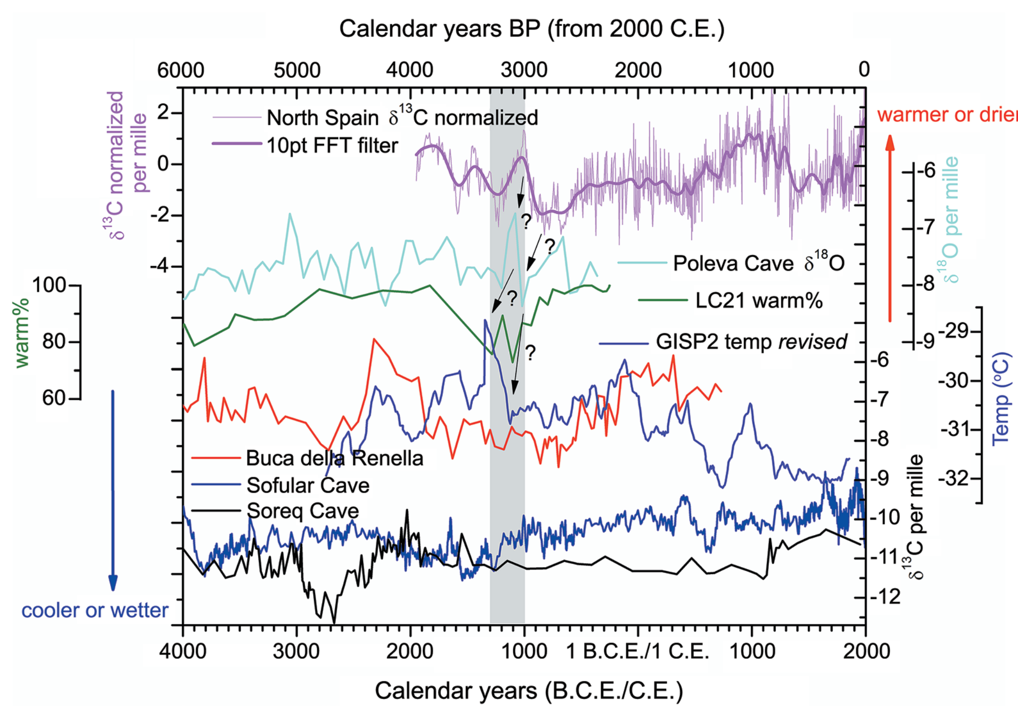

FIG. 5. Four δ^{13}C records and one δ^{18}O record from various Mediterranean and southeast European region speleothems; marine core data on warm-species foraminifera from the southwest Aegean (scale at left shows changes in percent warm to cold foraminifera with timescale following their maximum age correction to match age of the Santorini eruption); and the GISP2 temperature record (chronology revised after Southon 2004, fig. 3; cf. uncorrected ages in fig. 4 herein). For the data and information, see n. 64 herein. *Note*: Wetter (or cooler for north Spain, GISP2, and Poleva Cave data sets) is downward; drier (or hotter for north Spain, GISP2, and Poleva Cave data sets) is upward.

In sum, there is reasonable evidence from several proxies for more arid conditions in the last centuries of the second millennium B.C.E. in the Aegean–eastern Mediterranean region,[71] but precise dating, and thus close archaeological and historical association beyond the scale of one century, is currently absent. At the same time, it should be evident that climatic change is a very complex, multifaceted, and multiscalar issue. The circum-Mediterranean, moreover, is not a single climate system: there are important differences and even opposite correlations both west to east and north to south.[72] Depending on the level of data resolution as well as the location whence the data stem, different and even contradictory conclusions may result.[73] One clear example of this (or of fundamental chronological control issues) is evident from the end of second millennium B.C.E.: speleothem-derived temperature records from both northern Spain and Romania (see fig. 5) show a warming trend at this time, whereas several other records from the eastern Mediterranean and elsewhere (including Greenland ice-core and Aegean sea-surface temperature data [see figs. 4, 5]) suggest just the opposite—that is, a cooling trend.[74] Divergent data? It is perhaps more likely (and suggested for the Romanian data) that chronological looseness in the constituent data sets could allow them to be moved ("tuned") against each other, so that, for example, the temperature peak in the Romanian data matches the 14th-century B.C.E. peak in the Greenland record (note arrows and question marks in fig. 5).[75]

An additional and important aspect is seasonality. With respect to cooling episodes, such as the Little Ice Age, it is now argued that these affect mainly winter temperatures (and only marginally the annual average).[76] The implications in terms of annual precipitation, however, may vary for a region like the Mediterranean. Goudeau et al. observe in their data from the central Mediterranean that the cooling associated with the Little Ice Age is associated with humid conditions—compare that for central Anatolia[77]—whereas in contrast the cooling observed in the Bronze Age (their sampled interval is just after ca. 1000 B.C.E.) is accompanied by both dry winters and dry and warm summers, thus indicating year-round aridity and much more of a challenge to agrarian-based societies, at least in this case.[78]

Geographers Caseldine and Turney have pointed out that many paleoclimatic records have thus far been characterized by poor chronological controls and limited regional applicability, as well as by only a vague understanding of what those records actually mean in terms of past temperatures, precipitation, seasonality, and predictability.[79] Related to this is the likelihood that climatic change causing chaos or challenge in one area may produce the opposite effect in another area—for example, contrasting the eastern and western Mediterranean, or examining north–south gradients even within the eastern Mediterranean.[80] We might observe, for example, that the Little Ice Age period saw lengthy spells of arid, cooler conditions (drought), punctuated by extreme rainfall and flooding events, notably in the 16th and 17th centuries C.E. in the Aegean and especially Anatolia,[81] whereas it was a generally more favorable period with increased water availability in the western Mediterranean (Iberian Peninsula).[82] Carpenter emphasized precisely this issue of variability long ago with respect to the trade winds that affect Saharan, Mediterranean, and European weather patterns.[83] Even within the same subregion (e.g., the southern Levant), different proxies can give very different impressions—nicely highlighted for the Little Ice Age, where some sources indicate colder and wetter but others colder and drier.[84] As noted above, both the seasonal and year-long impacts, and differences therein, also need comprehensive assessment.

In his massive study on early civilizations, Trigger noted that "there is no basis for theories that attribute

[71] For another recent and repetitive summary, see Kaniewski et al. 2015, 6 May.

[72] Luterbacher et al. 2012; Roberts et al. 2012.

[73] Manning 2013, 104.

[74] See also Drake 2012, figs. 3, 4.

[75] See Constantin et al. (2007a, 334–35, fig. 7) for the suggestion of tuning the Poleva late second-millennium B.C.E. temperature peak to the Greenland record. However, the GISP2 (Greenland) record itself has chronological flexibility before ca. 3350 BP by 40–100 years (Southon 2004). We employ the published GISP2 chronology in our fig. 4, but our fig. 5 uses Southon's (2004, fig. 3) revised timescale.

[76] Goudeau et al. 2015.

[77] Roberts et al. 2012.

[78] Goudeau et al. 2015. The dates for intervals sampled are listed in their table 1.

[79] Caseldine and Turney 2010.

[80] E.g., Luterbacher et al. 2012; Roberts et al. 2012; see also Moody 2005, 465.

[81] Roberts et al. 2012; see also Grove and Conterio 1995; White 2011.

[82] Roberts et al. 2012.

[83] Carpenter 1966.

[84] Schilman et al. 2001, 169.

the rise of civilization to the influence of a single type of environment or climatic event."[85] To be sure, a shift to a more arid (year-round) climate as proposed in many of the studies surveyed above would have had a negative impact on certain, perhaps many, Late Bronze Age societies in the eastern Mediterranean, but the effects will not have been uniform across this region. In particular, we cannot regard climate as the ultimate, perhaps not even the proximate, cause of the contemporary collapse without establishing a robust, finely resolved chronology and taking a suite of other factors into account.

Earthquakes and Natural Disasters

Nur and Cline reconsidered Schaeffer's suggestion that earthquakes might be responsible for a widespread series of destructions throughout the eastern Mediterranean and ancient Near East, spread over a 50-year period (ca. 1225–1175 B.C.E.).[86] While some scholars expressed skepticism about the likelihood that such widespread disasters could have resulted from a single geological event, Drews presented a list of 47 sites in the region that had been destroyed over this 50-year period.[87] Although all these sites fall within what is demonstrably an area of intense seismic activity and thus have suffered from earthquakes throughout their occupational history, it remains quite difficult to demonstrate that the sites in question were destroyed by an earthquake as opposed to other natural or human-induced factors (flooding, subsidence or slipping of the earth beneath buildings, poor construction techniques, etc.). Even with cases examined in detail, and with historical perspective—for example, in a seismically active area such as Crete—it is notable that earthquakes seldom seem to result in such long-term, society-ending, historical change-point outcomes.[88]

Nur and Cline considered as examples of possible earthquakes the level of damage and destruction at several Late Bronze Age sites (Mycenae, Tiryns, Midea, Thebes, Sparta, and elsewhere in Greece; Troy in Anatolia; Ugarit, Megiddo, Akko, and Ashdod in the Levant) and contrasted this with what they felt might be evidence for destruction by "invaders" at other sites (Troy in Anatolia, Lachish and Aphek in the southern Levant).[89] They concluded that any number of the sites partly or totally destroyed over the 50-year period in question could have resulted from an "earthquake storm" along geological faults with the Aegean and eastern Mediterranean. As they pointed out, major earthquakes often occur in groups, known as storms, wherein a major quake is followed by subsequent quakes within days, months, or even years elsewhere along what has become a weakened fault line. Nur and Cline were careful to state that such a series of quakes would not, in and of themselves, have destroyed entire societies, much less brought an end to the Late Bronze Age (many of the sites were reoccupied after the relevant destructions). Rather, they suggested that we need to reconsider how such catastrophes might have been situated within other forces at work in the Aegean and eastern Mediterranean ca. 1200 B.C.E.

In the past, several archaeologists have suggested that earthquakes may have been responsible for destruction levels at their sites: for example, Blegen at Troy, Kilian at Tiryns and Mycenae, Callot and Yon at Ugarit. In his recently published study of the collapse at the end of the Late Bronze Age, Cline again postulates the likelihood of earthquake-related destructions at a series of sites in Greece, Anatolia, the Levant, and even at Enkomi on Cyprus,[90] where there is no such evidence. While at least one seismologist had previously expressed skepticism about this type of suggestion,[91] Langutt et al. reject Nur and Cline's proposal for an earthquake storm in 1225–1175 B.C.E. on the basis of paleoseismological studies (and the absence of any definitive evidence demonstrating that site destructions resulted from seismic events), the lack of references to major earthquakes in documentary sources, and the fact that site destructions in the Levant, at least, continued until ca. 1100 B.C.E.[92]

Although Sandars, in her classic work on the Sea Peoples, noted the likelihood of earthquake destructions at Ugarit and Alalakh in Syria and at Tell Deir Alla in Jordan contemporary with the end of the Late Bronze Age, she also emphasized, "In the lands surrounding the Mediterranean there have *always* been earthquakes, famines, droughts and floods, and in fact dark ages of a sort are recurrent."[93] Furthermore, she

[85] Trigger 2003, 279.

[86] Nur and Cline 2000; see also Schaeffer 1948; 1968, 753–68; 1971, 525–44. For a critical review of Schaeffer's ideas on earthquakes, see Hanfmann 1951, 1952.

[87] E.g., Rapp 1986, 375; Drews 1993.

[88] Sintubin et al. 2010.

[89] Nur and Cline 2000, 48–61.

[90] Cline 2014, 131, 133–34.

[91] Stiros 1996, 145–46.

[92] Langgut et al. 2013, 164 n. 16.

[93] Sandars 1987, 47, 174. Quotation from Sandars 1987, 19 (emphasis original).

noted, "Unparalleled series of earthquakes, widespread crop-failures and famine, massive invasion from the steppe, the Danube, the desert—all may have played some part; but they are not enough."[94] Some 35 years after its publication, Sandars' volume remains one of the most comprehensive accounts of the Sea Peoples and related phenomena, including climatic stress.

In Cline's study, although the collapse is described as a "fluid" event, its pivotal year is presented as 1177 B.C.E. Indeed, as Cline proposes in very different terms, we must bear in mind that collapse typically unfolds on a multidecadal scale and that very recent revisions to Egyptian historical chronology and radiocarbon dating in fact suggest a date 11 or so years earlier (discussed below). However one regards this dating problem, for Cline the causes and results of collapse remain interwoven and intractable:[95]

> [T]he Sea Peoples may well have been responsible for some of the destruction that occurred at the end of the Late Bronze Age, but it is much more likely that a concatenation of events, both human and natural—including climate change and drought, seismic disasters known as earthquake storms, internal rebellions, and "systems collapse"—coalesced to create a "perfect storm" that brought this age to an end.

Setting aside the perfect storm, we are inclined to agree that we must accept a complex and multifaceted scenario. As Dickinson recently summed it up, "it is a waste of effort to try to isolate a single cause or prime mover for the Collapse" at the end of the Late Bronze Age.[96] One or more factors—for example, prolonged negative climatic change—undoubtedly precipitated others to create a potentially disastrous cycle that undermined existing social, economic, and political structures, as observed in the case of the Little Ice Age and the Ottoman empire.[97] Even so, we cannot even begin to disentangle the final outcome and present a historical narrative until we can adequately resolve the relevant chronology.

THE CASE FOR CHRONOLOGY

The minimum criterion needed to assess whether climate can be considered in any way directly associated with historical change is to establish a chronological linkage. Thus, if climate can be shown to be particularly positive, or negative, as relevant to a particular region or even throughout a hemisphere, during years X_1 to X_n, and there is good archaeological or documentary evidence of historical impact and change (plausibly associated with such climate) in or immediately following those years, then it would be reasonable to assess whether there is a real linkage and a case of climate forcing, or affecting, history. This, of course, is no straightforward task, and it involves numerous variables.[98] Generally, significant change does not involve regular, high-frequency, single-year "blips," whether good or bad: human societies are usually well adapted to overcome lean or bad years. Rather it is longer, multiyear, even multidecade climatic episodes that may undermine long-standing agrarian, economic, and/or political regimes and that might precipitate historical change. Examples include the "epic drought" episodes in the western United States largely contemporary with the Medieval Warm Period, or the so-called megadroughts recognized in the Asian monsoon world, including the kingdom of Ankor.[99] Here, annually resolved dendroclimatic data indicate how periods of prolonged drought, and an intervening period of unusually increased precipitation that damaged the hydraulic infrastructure, combined to provide a very difficult climatic context and likely contributed to the decline of the kingdom.[100] The key criterion, then, is reasonably precise (high-resolution) and accurate or robust dating through which the climatic record can be securely associated with the archaeological and/or historical record, or at least with near-historical level engagement.[101]

When we consider the situation at the close of the Late Bronze Age in the eastern Mediterranean, we face a challenge in obtaining the necessary chronological resolution. There are many records of various types that may indicate aspects of climate in the region (discussed in detail, above and below), but very few provide high-resolution information for this period. The major study by Finné et al. reviewing the last 6,000 years of climate in the eastern Mediterranean highlights the problem well.[102] In all, they report some 94 data sets/studies relevant to the region with a stated

[94] Sandars 1987, 11.

[95] Cline 2014, 11 (quotation), 170, 174.

[96] Dickinson 2010, 489.

[97] White 2011.

[98] See, e.g., the discussions in Xoplaki et al. 2001.

[99] Cook et al. 2004, 2010.

[100] Buckley et al. 2010.

[101] Cf., e.g., historical period studies ranging from the classic of Le Roy Ladurie (1971) through, more recently, White 2011; Parker 2013.

[102] Finné et al. 2011 (noted above).

dating resolution, along with another 14 sets or reviews of data without chronological resolution.[103] Of those data sets covering the end of the Late Bronze and the earliest Iron Ages (ca. 1400–800 B.C.E.), not one consistently approaches adequate resolution (i.e., data at, around, or better than 10-year resolution), and none is "high-resolution" (as in annual, biannual, or similar resolution). In fact, most are very low resolution (multidecadal to century-plus scale): thus, any attempt to tie a specific historical process or archaeological event to these data is fraught at best. It is also problematic to try to compare these records with each other in the attempt to build a climate palimpsest: we have no control over the wide possible date ranges in each instance and no idea whether the real dating error is older or younger in each case. Therefore, either no apparent patterns emerge (when perhaps they should) or, very likely, false possible correlations appear when it may be that actually none of the records is in fact contemporary with any of the others.

Recent studies on the much later Roman and Byzantine periods in the Mediterranean have likewise noted the scarcity of well-dated climate records.[104] By comparison with the virtual absence of regionally relevant higher-resolution data for the close of the Late Bronze Age in the eastern Mediterranean, however, even the data-limited Roman and Byzantine periods have an abundance of solid evidence. This is a fundamental problem for relating climatic episodes to historical change during the period with which we are concerned.

Even the most recent paleoclimatic research (through early 2015) cannot resolve this basic issue. We have already critiqued in some detail the very coarse chronological resolution in several studies by Kaniewski and colleagues that substantially undermine their asserted temporal associations; similar comments could be made about most of the other studies we discussed. We take here one further example, the recent paper of Langgut et al., already mentioned above.[105] In that study, a relatively detailed pollen record covering the close of the Late Bronze Age is defined by six radiocarbon dates on short-lived samples.[106] The authors make the somewhat challenging assumption of uniform deposition in the relevant sediment context over a long (multimillennial) period and, because of the distribution of their radiocarbon-dated material (five dates between 752 and 946 cm depth and just one later date, at 397 cm), they have to extrapolate over a very long period with no dates at all. This includes, worryingly, the close of the Late Bronze Age on which their study focuses, as this falls in the middle of the extrapolated "void" in dated information.[107] They also ignore that two of the six dates (i.e., one-third of them) seem to offer poor agreement with their dating model (which also exhibits poor overall agreement).

If we reanalyze the radiocarbon data using a more realistic Age-Depth model with allowance for a possible variable deposition (up to two orders of magnitude), and if we do this at 1 cm resolution with 1 cm interpolation using OxCal and IntCal13,[108] we arrive at an unsettling outcome (see fig. 6, which shows our model in green vs. the Langgut et al. 2013 model in blue). The dating range at 95.4% probability for the period in which the close of the Late Bronze Age lies now has very coarse chronological resolution. Three major issues are evident. First, whereas Langgut et al. place the time ca. 1200 B.C.E. within 95.4% probability somewhere around 6 m in depth (give or take no more than 20 cm in the core and in the pollen record), our reanalysis places this calendar age as possibly anywhere from 677 to 530 cm (a range of almost 1.5 m) at 95.4% probability (631–574 cm at 68.2% probability, and still over a half meter of core). This renders any close control of the pollen record vs. chronology impossible. Second, whereas Langgut et al. imply a dating resolution of around ±100 calendar years at 1200 B.C.E. (at 95.4% probability), the reanalysis in figure 6 herein suggests real dating ranges for this period of about 846 calendar years at 95.4% probability or about 484 calendar years at 68.2% probability.[109] Third, Langgut et al.'s figure 3 shows core depth vs. their chronology and the interpreted climate record.[110] The arid end Late Bronze signal is indicated as approximately 625–599 cm and at ca. 1250–1150 B.C.E. The variable depth model in our figure 6 places this climate signal as 1450–1033 B.C.E. at 68.2% probability and

[103] Finné et al. 2011, table 1.

[104] McCormick et al. 2012; Manning 2013; Haldon et al. 2014.

[105] Langgut et al. 2013.

[106] Langgut et al. 2013, 154, fig. 2, table 2.

[107] Langgut et al. 2013, fig. 2.

[108] Bronk Ramsey 2008; Bronk Ramsey and Lee 2013; Reimer et al. 2013.

[109] Langgut et al. 2013, fig. 2.

[110] Langgut et al. 2013, 157.

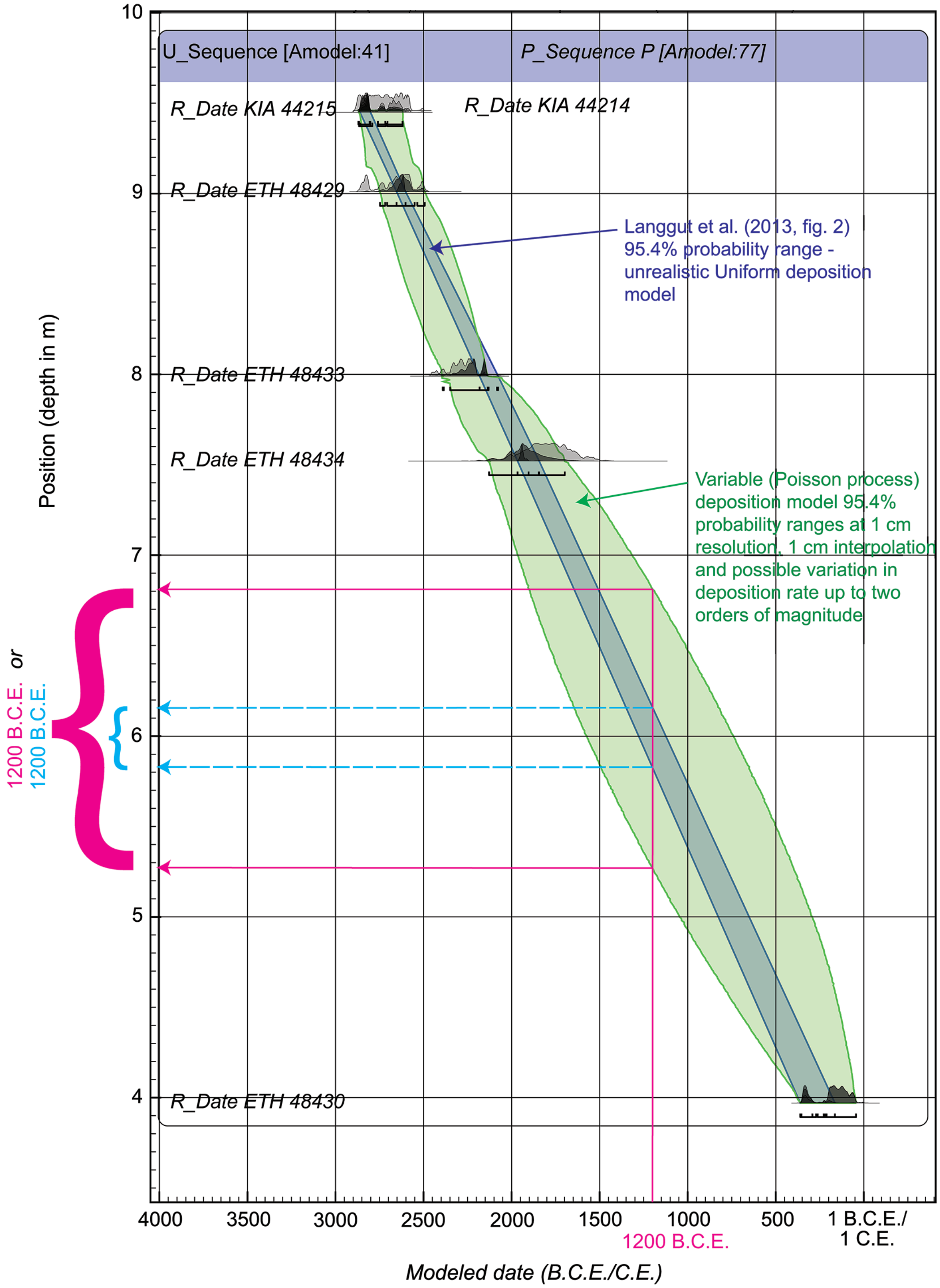

FIG. 6. Age-Depth model for the six radiocarbon dates stated to be on short-lived samples from the Sea of Galilee core in Langgut et al. 2013. The blue model repeats the (unrealistic) Uniform deposition model shown in Langgut et al. (2013, fig. 2) with (as there, but unstated) the 95.4% probability dating range shown. The green model shows the 95.4% probability range if one instead employs a more realistic variable deposition model (see n. 31 herein for methods). The depths in the core that could represent 1200 B.C.E. within 95.4% probability ranges are indicated by the magenta (solid) and cyan (dashed) lines (and brackets). Whereas the Langgut et al. (2013) model appears to narrow this down to a span of less than 40 cm at most, the realistic variable deposition model instead suggests a possible range of nearly 150 cm (1.5 m). Models created using OxCal 4.2.3 (Bronk Ramsey 2009b, 2013) and the IntCal13 atmospheric curve, with curve resolution set at 5 (Reimer et al. 2013).

as 1665–765 B.C.E. at 95.4% probability. Any claims of further precision are just subjective and/or selective. At best this situation is low resolution, and at present it is of little useful resolution.

We thus suggest that real progress toward assessing the role of climate at the close of the Late Bronze Age in the eastern Mediterranean requires much higher-resolution data, especially from the climate side. Our critique of chronological matters has not yet mentioned problems associated with the dating of the archaeological and historical evidence for the end of the Late Bronze and early Iron Ages. Since the work of Bronk Ramsey et al. demonstrated that sophisticated analysis of a large set of radiocarbon data yields a chronology compatible with (and even refining) the Egyptian historical chronology for the second through early first millennium B.C.E., it is clear that there is no inherent conflict between the historical-archaeological and radiocarbon timescales through this period in the eastern Mediterranean (contrary to some previous concerns).[111] What we may now observe is that in periods where there are many archaeological connections between the Aegean–eastern Mediterranean cultures and Egypt, such as from the 15th to early 12th centuries B.C.E., radiocarbon and historical dates are more or less the same.[112] In contrast, there are sometimes difficulties in those periods where there are few secure archaeological linkages, such as the late Middle Bronze Age to initial Late Bronze Age, and the later 12th to 10th centuries B.C.E., where previous best guesses from limited material culture associations can be overturned when large robust sets of radiocarbon dates become available.[113]

Some comment, however, is required on the recent paper of Wardle et al. that proposes dates between 70 and 100 years earlier for the later phases of the Aegean Late Bronze Age. They suggest that what they term the Late Helladic (LH) IIIB period ends, and LH IIIC begins, ca. 1341–1282 B.C.E. (95.4% probability)—more or less a century earlier than the commonly accepted date (ca. 1200 B.C.E.).[114] If correct, this would significantly affect all discussions of the archaeology and history of the eastern Mediterranean, not only with respect to the best reconstruction of the Egyptian (and Mesopotamian) historical calendar evidence but also to radiocarbon dating.[115] The proposed "high" Assiros chronology corresponds to a culture-time period (LH IIIA–IIIC) when there are multiple material culture linkages between the Aegean and eastern Mediterranean,[116] and thence directly or indirectly with both the historically and compatibly radiocarbon-dated world of Egypt. The Assiros phase 9 dates could only just be compatible with the well-known (late) LH IIIA2 ceramics at Tell el-Amarna in Egypt, themselves dated precisely by historical evidence and radiocarbon to the mid 14th century B.C.E.,[117] but from then on Assiros radiocarbon chronology clearly diverges. Although Wardle et al. suggest that there is little substantive Late Bronze Age radiocarbon evidence prior to their work, their schema in fact is at odds with several reasonable sets of radiocarbon evidence tied directly to relevant Late Helladic material. For example, (1) there is good evidence from the end of the LC IIC period on Cyprus, and more or less the LH IIIB–IIIC transition, where a date around or just after 1200 B.C.E. is evident,[118] and (2) other evidence from the Uluburun shipwreck, which places the (late) LH IIIA2 period and (early) LC IIC in the late 14th century B.C.E., a date consistent with the conventional chronology and based on a large set of radiocarbon data allied with dendrochronological sequencing.[119]

How can we explain this discrepancy? The fundamental issue appears to be the labels used—style/feature vs. time period—and the appropriate coordination of pottery definitions. Thus, the very style features employed by Wardle et al. to suggest a LH IIIC date, while formerly thought typical of LH IIIC, are features now recognized as clearly present in LH IIIB contexts.[120] This could undermine the stated coordination of the stratigraphic phases at Assiros with Late Helladic

[111] Bronk Ramsey et al. 2010.

[112] E.g., Manning et al. 2001, 2009, 2013; Toffolo et al. 2014.

[113] E.g., Manning 2014; Manning et al. 2014; Wardle et al. 2014, 15 September—and note comments in their (online) "Supporting Information" concerning Toffolo et al. 2013, 26 December.

[114] Wardle et al. 2014, 15 September, esp. table 1.

[115] E.g., Bronk Ramsey et al. 2010 (and as updated and rerun in Manning 2014); see also Manning 2006–2007; Schneider 2010; Kaniewski et al. 2011, 8 June (modified as in our fig. 2); Toffolo et al. 2013, 26 December; 2014.

[116] E.g., Warren and Hankey 1989, 146–67. Note the contrast with the Thera case, where there is a lack of multiple and unambiguous archaeological linkages (Manning 2014; Manning et al. 2014).

[117] Manning et al. 2013.

[118] Manning et al. 2001; Manning 2006–2007.

[119] Manning et al. 2009; Manning 2014, 189–90.

[120] See, e.g., French and Stockhammer 2009.

phases in the southern Aegean, and the "high" LH IIIC dates from Assiros may actually be LH IIIB in current southern mainland terms. Beyond needed clarification from ceramic specialists, we also need a substantive radiocarbon dating project on an established southern mainland LH IIIB–IIIC sequence. There are other potential issues with details of the Wardle et al. study that could indicate later, real ages[121]—for example, (1) the calibration curve employed in some cases;[122] (2) the consistency of the data;[123] (3) the age of the animal bones vs. the seed material;[124] (4) the use of dendrochronological information in the dating model;[125] and (5) the appropriateness of the supposed dendro-calendar date.[126]

We raise only one point about historical dating. Although it has become standard in recent years to regard a date for the accession of Ramesses II as all but settled at 1279 B.C.E., such convention has now been questioned. Recent reanalysis of the historical evidence tends to suggest a date some 11 years earlier for the accession of Ramsesses II, at 1290 B.C.E., and the analysis of the radiocarbon evidence relevant to Egyptian regal chronology appears consistent with that earlier date.[127] If correct, year 8 of Ramesses III would not be 1177 B.C.E. but rather 1188 B.C.E.[128] In our view, this case highlights the problem of trying to be overspecific and pinpoint any event when secure chronological controls are lacking. We would suggest that it is essential to examine the structures and processes evident at the available but somewhat more general, at best decadal, historical timescale, which is how we proceed in this study.[129]

This chronological critique suggests that we lack any usefully defined (in temporal terms) climatic data from the eastern Mediterranean region. We can refer to impressive high-resolution data from other areas, whether Arctic ice cores or some speleothems, or some tree-ring records, or general background forcing records of solar activity. These, however, either reflect very different climate zones (such as the Black Sea area for the Sofular Cave speleothem or Indian Ocean monsoon for the Oman speleothems; or Ireland, Germany, or the Alps

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[121] Fantalkin et al. (2015, 26, 39–40) also raise some objections to the Wardle et al. (2014, 15 September) paper. Some of their arguments are similar to those we suggest below, and some are irrelevant (e.g., regarding the dating of the Thera eruption where radiocarbon, Aegean archaeology, and Egyptian history can all be compatible; see Manning 2014; Manning et al. 2014).

[122] Wardle et al. (2014, 15 September, 6) state that they used the IntCal13 radiocarbon calibration curve, but their figs. 3, 4, S1, S6, S11, and S12 all indicate use of the IntCal09 calibration data set. Crucially, the revised IntCal13 data set made some key changes for the period covering the later 14th and 13th centuries B.C.E. (Manning et al. 2013; Reimer et al. 2013; Manning 2014, fig. RE33).

[123] Wardle et al. (2014, 15 September) acknowledge only two significant outliers in their data (their table S6 shows seven outliers). If their model is rerun with IntCal13, the number of outliers increases to 12, or nearly 16% of the constituent elements. Thus, their dating model offers very poor OxCal agreement values of A_{model} 4.9 < 60 and $A_{overall}$ 5.7 < 60. Sample Hd-25517 is entirely discordant. However, this routine (vs. AMS) high-precision radiocarbon age would have been based on a set of emmer wheat seeds and so should be a good "average" value for the phase 6 destruction. The date, the only one from the destruction context, nicely matches the conventional chronology but is a complete outlier against the Assiros model.

[124] The high Assiros dates result specifically from the radiocarbon measurements on animal bone, yet for phases where there are dates on both seeds and animal bones, the latter are noticeably older: on average, phase 9 by just over 50 ^{14}C years and phase 6 by just over 90 ^{14}C years. This suggests some unrecognized problem.

[125] The dendrochronological samples employed comprise short ring sequence pieces reassembled (Newton et al. 2003, 179); standard tree-ring cross-dating is not possible in this case. Phase 9 samples are thought to end with the ring immediately below bark, but the purported evidence for bark on ASR-13 (phase 6: Wardle et al. 2014, 15 September, table S2) was not recorded when the sample was studied (information held in files at the Cornell Tree-Ring Laboratory). Instead, only possible sapwood (unspecified) was noted on two of 20 subsamples and, for the phase 2/3 samples, Newton et al. (2003, 184) state that the outermost extant rings "cannot clearly be demonstrated as being sapwood." Based on measurements of the samples when excavated vs. when dendro-studied, Newton et al. (2003, 180) estimated that 11 rings were missing from ASR-5 and 8 rings from ASR-8 and ASR-6+7. Clearly not only the bark was stripped, but perhaps also the sapwood. Thus, we might estimate several missing rings and/or the entire sapwood. This will push the wiggle-match dates later compared with those from the analyses of Wardle et al. 2014, 15 September.

[126] This date was achieved by matching fragmentary oak sequences from Assiros in northern Greece against a central Anatolian conifer record (Newton et al. 2003, 180–81)—and employed as a C_Date in the Wardle et al. model; this is methodologically problematic. The constituent trees are very different species from very different climatic and environmental settings, and the overlap is not sufficiently long for a reliable cross-date. Thus, the stated date cannot be considered a reliable calendar date and should be excluded from Wardle et al.'s (2014, 15 September) dating model.

[127] Schneider 2010; Aston 2012–2013. For the radiocarbon evidence, see Bronk Ramsey et al. 2010; Manning 2014, 20–3, 116–33, 181–85.

[128] As already noted in Cline 2014, 1, 172, 181 n. 3.

[129] Using specific dates from Schneider 2010.

for tree rings) or are merely approximate, hemisphere-wide indicators, such as summer-temperature reconstructions from Greenland ice, to global background signals (the sun). In no case do these data really allow us to infer precisely any marked precipitation changes in the eastern Mediterranean, as several recent or older papers argue. This lacuna in our knowledge is one that paleoclimatologists, archaeologists, and ancient historians should seek to address.

Having considered at some length the problems associated with paleoclimatic and chronological data that bear on the end of the Late Bronze Age in the eastern Mediterranean, how do the documentary and archaeological records compare?

THE DOCUMENTARY CASE

According to Ramesses III's Medinet Habu inscription, the Peleset, Tjeker, Šekelesh, Denyen, and Wešeš "devastated" the polities of Hatti and Arzawa (in Anatolia), Qodi (Qadesh in Syria), Alašiya (Cyprus), and Carchemish (whose king was in charge of Hittite affairs in Syria, including those at Ugarit). Other documents, both earlier and later, also mention some of these groups:[130] for example, the Šikila (Tjeker) "who live on ships" (from Ugarit, Ras Shamra [RS] 34.129); the Šerden, Eqwesh, Šekelesh, Tereš, and Lukka (Egypt, Year 5 of Merneptah); the Šerden and Wešeš;[131] the Lukka (El-Amarna [EA] 38) and Šerden (EA 81, 12, 123); and several others. There is some level of consensus that these "Sea Peoples" swept through various regions of the Aegean, Cyprus, Anatolia, the Levant, and Egypt at various times from the 14th through 11th centuries B.C.E. Some elements within these group(s) may have formed part of "the enemy" whose ships and land battles were mentioned in some Akkadian documents exchanged between Ugarit and Alašiya toward the end of the 13th century B.C.E. (RS 20.18, RSL 1, RS 20.238—discussed below). (For all place-names cited in text, see fig. 7, below.)

Documentary evidence, of course, presents various problems of interpretation, and the Egyptian texts—often filled with hyperbole—typically were motivated by politico-ideological concerns and intended for rhetorical effect rather than reasoned argument. At least some Egyptologists[132] have been skeptical about the historicity or chronological place of the Medinet Habu inscription, while some Assyriologists[133] regard the Sea Peoples' episode as a narrative condensation of several minor skirmishes that took place over many generations into a couple of imaginary battles for propagandistic ends suited to pharaonic purposes. Roberts suggests that regardless of the historicity of Ramesses III's year 8 reliefs and inscriptions at Medinet Habu, their main purpose "was not to record an invasion by hostile northerners, but rather to record the actions of Ramesses III" in accordance with the Egyptian worldview.[134] In a more recent study, taking into account the way foreigners (the "other") were presented in the inscriptions and reliefs of Ramesses III at Medinet Habu (and elsewhere), Roberts assesses and questions the validity of 150 years of scholarship on the Sea Peoples. He comments decisively: "I do not believe that critical analysis of the Egyptian evidence at Medinet Habu can establish the historicity of an invasion of the sort that is widely assumed, let alone an extended period of unrest."[135]

The relevant cuneiform documents from Ugarit in Syria paint another picture, one that is certainly more believable but often vague about the chronological placement and sequence of events or the identity of the individuals or groups mentioned (table 1). For example, the "General's Letter" (RS 20.033) from the House of Rap'anu renders the report of an envoy of an unnamed king of Ugarit to an army general named Sumiyanu, who was in charge of the kingdom's defenses along its southern frontier with the neighboring polity of Amurru. Whereas Schaeffer suggested that the king in question was Niqmaddu III, the next-to-last king of Ugarit who ruled at the very end of the 13th century B.C.E., Izre'el and Singer proposed a time almost 200 years earlier.[136] Beyond extrapolating from the events described in the documents, typically unique and unanchored in time or place, there is no way to demonstrate that one interpretation, or one proposed chronology, is more likely than the other.[137]

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[130] For an exhaustive recent listing, see Adams and Cohen 2013; see also Cline and O'Connor 2003 (with English translations of the relevant texts). For the definitive English-language version of the el-Amarna tablets, see Moran 1992.

[131] *P. Harris* I; Grandet 1994, 1:76.7–9.

[132] E.g., Lesko 1980; Redford 2000, 7.

[133] E.g., Liverani 1990, 121; Cifola 1994.

[134] Roberts 2009, 60.

[135] Roberts 2014, 359–60. Middleton's (2015) critique of the Mycenaean origins of the Philistines similarly regards the Sea Peoples narratives as "colourful stories," essentially historical myth.

[136] Schaeffer 1968, 640–69; Izre'el and Singer 1990, 110–11.

[137] Yon 2006, 127.

TABLE 1. Akkadian and Ugaritic documents from Ugarit, mentioned in text.

Text No.	Findspot	Subject Matter	Date
RS 20.033	House of Rap'anu	military report	14th–13th centuries B.C.E.
RS 20.238	Palace of Ugarit	royal letter—Alašiya	13th–12th centuries B.C.E.
RS 20.18	–	official letter—Alašiya	?
RSL 1	–	royal letter—Carchemish?	?
RS 88.2009	House of Urtenu	official letter—Carchemish	?
RS 19.11[a]	–	letter	?
RS 20.162	House of Rap'anu	letter—Amurru	?
RS 34.129	–	royal letter—Šikila	13th century B.C.E.?
RS 94.2523	House of Urtenu	royal letter—Ahhijawa	?
RS 94.2530	House of Urtenu	royal letter—Lukka	?
RS 18.113A[a]	–	royal letter Alašiya	?
RS 34.147	–	list of Carchemish ships	?

[a] Ugaritic.

To take a further example, one among many of this genre that revolve around the island of Cyprus (Alašiya): in an Akkadian royal letter found in the palace of Ugarit (RS 20.238), the unnamed king of the town writes to an unnamed king of Alašiya that while his own army and navy are elsewhere engaged (in Hatti and Lukka, respectively), seven ships of "the enemy" have arrived, set fire to his towns, and inflicted troubles on the country.[138] This clay tablet was originally found (along with more than 150 others) in what the excavators thought was a kiln; they suggested the tablet may still have been in the kiln during the assault of the "enemy" against Ugarit.[139] Thus, it was dated to the final days of Ugarit and possibly never sent to the king of Alašiya. More recent reexamination of the "kiln," however, indicates that it was an oven installed by squatters after the palace was destroyed and that all the tablets had probably been stored in a basket that had fallen from a second-story floor when the building collapsed after its abandonment.[140] If that is the case, then none of these tablets can be assigned to the last days or even the final years of Ugarit. Singer nonetheless suggested this document may discuss the same event as that outlined in two other letters (RS 94.2523, RS 94.2530) sent to ʻAmmurapi of Ugarit at the end of the 13th century B.C.E. (discussed below).[141]

Another letter (RS 20.18) from a high-ranking official (Eshuwara) in Alašiya to the king of Ugarit reads like a possible response: he mentions the deeds carried out against the people of Ugarit and its ships, declines any responsibility for them, and warns that 20 further ships of "the enemy" have been launched (to/from a "mountainous region"?) and that the king of Ugarit should take defensive measures.[142]

Yet another royal letter, RSL 1, to the king of Ugarit has usually been taken as the initial letter in this chain (i.e., preceding RS 20.238).[143] In it, an unnamed "king" whose country is not stated mentions that if indeed enemy ships had been sighted at sea, the king of Ugarit should gather his infantry and chariots within the city walls and fortify them. Although this letter appears to fit snugly into the correspondence between Ugarit and Alašiya, those who have studied these documents and their script most closely believe that RSL 1 was sent not from the king of Alašiya but from the king of Carchemish (viceroy of the Hittite king) to his underling in Ugarit.[144] The more relevant point here is that this text cannot be dated any more precisely than the others.

[138] Nougayrol et al. 1968, 87–9. See Knapp (1996, 27) for English translation by G. Beckman.

[139] Schaeffer 1962, 31–7.

[140] Calvet 1990, 40 n. 2; Millard 1995, 119; Singer 1999, 705; see also Cline 2014, 10, 109–12.

[141] Singer 2006, 250.

[142] Nougayrol et al. 1968, 83–5, no. 22; Knapp 1996, 27 (translated by G. Beckman); see also Singer 1999, 721.

[143] Following Nougayrol et al. 1968, 85–6 n. 1, no. 23; see also Knapp 1996, 27 (translated by G. Beckman).

[144] Yamada 1992, 431 n. 6; Singer 1999, 720–21 n. 394.

A more recently recovered letter (RS 88.2009) from the House of Urtenu in the southern sector of Ugarit, however, indicates that Carchemish had promised to aid and help protect Ugarit. Curiously, this letter was sent by an official (not the king) at Carchemish, named Urhi-Tešub, to the "elders" (not the king) of Ugarit, informing them that the king of Carchemish had left the land of Hatti (i.e., Anatolia) with reinforcements and that they should defend the town until their arrival. Again, the dating of the text is uncertain, but if it did belong to the very end of the 13th century B.C.E., we must assume these troops never arrived, as the town was destroyed shortly thereafter.[145] Another letter, written in Ugaritic cuneiform (RS 19.11), would seem to describe the grim outcome, although it, too, lacks a secure date: "When your messenger arrived, the army was humiliated and the city was sacked. Our food in the threshing floors was burnt and the vineyards were also destroyed. Our city is sacked. May you know it! May you know it!"[146]

Several other documents in the archives of Ugarit have been shoehorned into an interval of time spanning the turn from the 13th to the 12th century B.C.E., but few of them can be so accurately dated. These include but are not limited to the following:

RS 20.162: an Akkadian text from the Rap'anu archive in which a man named Parsu requests the king of Ugarit to forward information on "the enemy" to the land of Amurru; he adds that some ships of Amurru will be made available to Ugarit.[147]

RS 34.129: an Akkadian text referring to the Šikila people.[148] In it the Hittite king (unnamed, but perhaps Šuppiluliuma II) writes to the governor of Ugarit to learn more about this elusive enemy, demanding an interview with one 'Ibnadušu, who had been captured by the "*Šikila*-people, who live on ships." Singer, who accepts the equation of Šikila with Egyptian Šekelesh therefore suggests that "the same seaborne enemy" threatened both the Hittite and Egyptian states.[149]

RS 94.2523, RS 94.2530: two Akkadian letters from Ugarit (House of Urtenu) in which the Hittite king and his chief scribe (Penti-Šarruma) reprimanded the last king of Ugarit for failing to send his ships (loaded with food rations? or metal ingots?) to the Hiyawans (Ahhijawa) who awaited them in the Lukka land.[150]

RS 18.113A: a letter written in Ugaritic from an unnamed official to the king (of Ugarit?), indicating that the latter will sell ships to the king of Alašiya.[151] It may be noted here that Amarna letters EA 39 and 40 both demonstrate that the king of Alašiya owned what seem to be merchant ships ("round boats"), while *KBo* 12.38 (Hittite document from Hattuša) indicates that this ruler also had warships ("long boats") in his fleet. In this document, Šuppiluliuma II states that he set out to sea and that "the ships of Alašiya met me in battle three times." He claims to have set them on fire and destroyed them, but the land battle that followed may have had a different outcome (see further below).

RS 34.147: lists 14 unseaworthy ships of the king of Carchemish harbored in the port at Ugarit, while RS 34.138 is a letter sent from the king of Carchemish to the queen of Ugarit, giving her permission to send some ships to Byblos and Sidon but no farther.[152] Both texts suggest that the Hittites, whose vassal occupied the throne at Carchemish, were concerned to maintain a fleet of ships at Ugarit.[153]

In sum, then, the documentary evidence from Ugarit suggests that the town was harassed periodically by enemy ships from the sea and by land-based troops on their own borders; at the same time, its resources were being drained by Hittite demands for food, ships, and military support.[154] While some of these documents can be dated to the end of the 13th or the beginning of the 12th century B.C.E., others certainly cannot, and any historical or paleoclimatic reconstructions must take that caveat into account.

Other sections of Hittite, Akkadian, and Ugaritic documents have been understood as relating to a grain shortage and famine at this time (table 2).[155] These are the documents that paleoclimatologists typically cite to confirm their conclusions regarding climate change.[156]

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[145] Singer 1999, 729.

[146] Virolleaud 1965, 137, no. 114 (Dietrich et al. 1976, 2.61). Translation by Singer 1999, 726.

[147] Nougayrol et al. 1968, 115–17, no. 37; Singer 2006, 246.

[148] Bordreuil 1991, 38–9, no. 12.

[149] Singer 1999, 722.

[150] Lackenbacher and Malbran-Labat 2005, 237–38. Singer (2006, 251–58) argued for a shipment of metals, but why the Hittites would wish to supply the Ahhijawa with metals and have them sent by Ugarit is not explained satisfactorily.

[151] Virolleaud 1965, 1–15, no. 8; Dietrich et al. 1976, 2.42; Knapp 1983.

[152] Bordreuil 1991, 23–5, no. 5; 31–2, no. 8.

[153] Singer 2000, 22.

[154] Routledge and McGeough 2009, 29.

[155] Singer 1999, 715–19; see also Klengel 1974; Divon 2008.

[156] E.g., Kaniewski et al. 2010, 213.

TABLE 2. Famine and grain-shortage texts: Akkadian, Egyptian, Ugaritic, and Hittite.

Text No.	Findspot	Subject Matter	Date
KUB 21.38	Boğazköy	royal letter to Ramesses II	13th century B.C.E.
KUB 3.34	Boğazköy	Hittite delegation to Egypt	13th century B.C.E.
Kitchen 1982, 5.3	Egypt	Merneptah—grain to Hatti	end 13th century B.C.E.
RS 94.2002+2003	House of Urtenu	Merneptah—grain to Ugarit	end 13th century B.C.E.
No. 52055/1	Tel Aphek, Israel	Egyptian overseer—grain from southern Levant to Ugarit	13th century B.C.E.
RS 20.212	Ugarit	royal letter—grain from Mukish to Ura	13th century B.C.E.
RS 26.158	Ugarit	letter—grain to Ura	?
RS 18.038[a]	Ugarit	no grain left in Ugarit	?
RS 34.152	House of Urtenu	general famine (from Emar?)	?

[a] Ugaritic.

Among them, *KUB* 21.38 is a Hittite letter sent by the Hittite queen Puduhepa to Ramesses II (1290–1224 B.C.E.), asking the pharaoh to take over her dowry—horses, cattle, and sheep—because there is no grain in her lands. *KUB* 3.34 may be a response; it indicates that a Hittite delegation was sent to Egypt (after the peace treaty established between Hatti and Egypt, ca. 1260 B.C.E.) to procure and ship barley and wheat to Hatti.[157] Merneptah (1224–1214 B.C.E.), who succeeded Ramesses II as pharaoh, claimed that he organized for grain to be shipped "to keep alive the land of Hatti."[158] Another letter of Merneptah, more recently found in the House of Urtenu at Ugarit (RS 94.2002+2003), mentions shipments of grain from Egypt to relieve a famine in Ugarit itself.[159] An Akkadian letter from Tel Aphek (Israel), sent from the governor of Ugarit to the Egyptian overseer of Canaan toward the end of the 13th century B.C.E., also records a grain shipment from the southern Levant to Ugarit.[160]

In RS 20.212, an Akkadian royal letter from Ugarit, the Hittite king reprimands the king of Ugarit for reneging on his obligations, most importantly ("a matter of life or death") for failing to provide a large ship and crew to transport 2,000 measures of grain from Mukish (north Syria) to Ura (Cilicia) under the supervision of two Hittite officials.[161] Another fragmentary Akkadian letter (RS 26.158) also deals with the transport of grain to Ura.[162] In RS 18.038, an Ugaritic text that may be a translation of a similar letter sent by the Hittite king to ʿAmmurapi (end of the 13th century B.C.E.), the Ugaritic ruler is quoted as proclaiming that there is no grain left in his land.[163] RS 34.152 is an anonymous letter (from an unknown sender, perhaps at Emar in inland Syria, to an unknown receiver) found in the Urtenu archive at Ugarit, which states that there is a famine in the land and that everyone is about to starve to death.[164] In none of these exchanges is the timing of the actual events well established, at least beyond a ruler's reign. Moreover, in Divon's view, the relation of many of these texts to food shortage is uncertain or based on questionable assumptions.[165]

Singer discussed thoroughly and admirably all the texts from Ugarit and several more—anything that relates to grain shipments or a possible famine in coastal and inland northern Levant and Anatolia, ostensibly at the very end of the Late Bronze Age.[166] He noted in passing that the dating for many of these texts remains unknown, since sender and recipient often go unnamed. Both Singer and Cline in his wake have woven compelling narratives—in very distinctive ways—of the last days of Ugarit and the disasters that piled up, one after another, in the final decades of

[157] Edel 1994, 1:184–85, 2:281–82; Pfälzner 2012, 771–72.
[158] Kitchen 1982, 5.3.
[159] Singer 1999, 711–12.
[160] Owen 1981.
[161] Nougayrol et al. 1968, 105–7, no. 33.
[162] Nougayrol et al. 1968, 323–24, no. 171.
[163] Virolleaud 1965, 84–6, no. 60; Dietrich et al. 1976, 2.39.
[164] Bordreuil 1991, 84–6, no. 40.
[165] Divon 2008, 103–4.
[166] Singer 1999, 715–19.

the 13th century B.C.E. and the early years of the 12th century.[167] Singer in particular scoured the relevant Akkadian, Ugaritic, and Hittite archives, attempting to synchronize rulers, vassals, and scribes and to establish some sequence of events; he also suggested that most of the texts from Ugarit belong to the last 50 years of the town's existence.[168] As he emphasized, Ugarit is the only site in the eastern Mediterranean whose documents continue to mention the dilemma, and the enemies who threaten its existence, right up to the point when the city actually falls.[169]

Broodbank suggests that we have taken the wrong message from such of these texts that may refer to grain shipments, whether those that stemmed from Egypt or are recorded as being en route to Hatti.[170] He maintains that rather than indicating a catastrophic drought in the late 13th-century B.C.E. eastern Mediterranean, these "snippets" more importantly signal the first recorded instances of shipping grains in bulk over long distances by sea. That many such shipments originated in Egypt should not surprise us, as its harvests—as least during periods of strong centralized control like that of the Late Bronze Age—were both plentiful and as reliable as the annual Nile floods.[171] Instead of drought, famine, or overexploitation of landscapes, Broodbank sees grain-shipment texts as "an index of robust precocity, rather than weakness." He concludes that the transformations evident at the end of the Late Bronze Age "began and ended with human actions."[172] That is certainly the case, but the multiplicity of factors that must be considered suggests that the answer is not so simple (see further below), and even if it were we still need to consider the intentionality, or not, of such human agents.

The Hittite sources may signal a shift or at least a division in power between the state's last two rulers and their blood-related subsidiaries (also "kings") in Tarhuntassa (Cilicia?) and Carchemish (north Syria).[173] Beyond this there is only Šuppiluliuma II's proclaimed victory over the ships from Alašiya and perhaps his defeat in a follow-up battle on land, as well as his wish (noted in an Akkadian text) to interrogate ʿIbnadušu about the Šikila people (see above).[174] In Singer's elaborate reconstruction of events described on the "Südburg inscription" from Hattuša, Šuppiluliuma II conducted three military campaigns along Anatolia's Mediterranean coast in a last-ditch effort to contain the Sea Peoples' advances.[175]

Despite the appearance over the past 20-some years of at least five major symposia or publications on the Sea Peoples and the "crisis" or "transition" at the end of the Late Bronze Age,[176] together with other related monographs and articles far too numerous to cite here,[177] there continues to be widespread disagreement over most details of what may have happened at the end of the Late Bronze Age: the main agents of change; the sequence or synchronization of all the warnings, battles, and food shortages mentioned in Akkadian, Hittite, Ugaritic, and Egyptian documents; the correlation—such as is possible—between the archaeological and documentary records; the actual causes (proximate or ultimate) of the crisis.

However we regard the documentary evidence (of which the above is a good representative sample), and in whatever sequence we view the archaeological record (for which see the following section), we still do not understand fully just how pervasive the Sea Peoples movements actually were or whether such peoples ever acted collectively as a unified force. Their proposed origins or destinations range from Sardinia in the west to the Balkans, through Anatolia to the north Mesopotamian steppe in the east, and south all along the Levantine littoral to Egypt and Libya. Although it is unlikely that such diverse bands of migrants, pirates, or marauders ever unified with a single purpose, or in and of themselves precipitated the final collapse of the politico-economic and ideological system(s) that linked together so many Bronze Age states and kingdoms in the Aegean and eastern Mediterranean, in the end they suffered the same fate. Most Late Bronze Age polities in the region gradually—some rapidly—disintegrated, as did the always-vulnerable interaction sphere(s) that had sustained them. In short, while external factors

[167] Singer 1999, 704–31; Cline 2014, 103–8, 142–45, 150–51.

[168] Singer 1999, 704–5; 2006.

[169] Singer 1999, 726.

[170] Broodbank 2013, 460–61.

[171] Which, of course, varied, as discussed for the Roman period in McCormick et al. 2012, 183, fig. 10.

[172] Broodbank 2013, 461.

[173] Hawkins 2009, 164.

[174] Singer 2000, 27.

[175] Singer 2000, 27–8; see also Otten 1989; Hawkins 1990, 1995; Hoffner 1992, 49, 51.

[176] Ward and Joukowsky 1992; Gitin et al. 1998; Oren 2000; Bachhuber and Roberts 2009; Killebrew and Lehmann 2013.

[177] See Killebrew (2005) and Cline (2014) for two very different attempts at synthesis.

like the Sea Peoples surely played a part during these troubled times throughout the region, so, too, did internal troubles (social, political, economic), if not the climate, in all these different areas.

THE ARCHAEOLOGICAL CASE

The archaeological case is even more complex, and it is impossible in a study such as this to do justice to the widespread and always-increasing archaeological record. Here we can only attempt to summarize some of the more relevant instances of destruction and abandonment that took place throughout the Aegean and eastern Mediterranean in the period between ca. 1250 and 1150 B.C.E. Trying to coordinate in a meaningful chronological manner a series of destructions and abandonments over an area stretching from western Greece through the hinterlands of Mesopotamia and from Anatolia to Egypt (an area of some 6 million km^2) (fig. 7), and extending over some 100+ years, is an unending and largely selective task, one subject to the vagaries and reporting of ongoing archaeological fieldwork that is itself seldom up-to-date in published form. Let us consider each area in turn, at least briefly.

The Aegean

Although a host of scholars would, perhaps justifiably, extend the area of relevance to the Balkans, Italy, and the central Mediterranean,[178] we begin our discussion in the Aegean, the westernmost extent of the "palatial" societies under consideration here. The final destructions at the end of Late Helladic (LH) IIIB, ca. 1200 B.C.E., of the palaces at Mycenae, Midea, Pylos, Thebes, Dimini, Orchomenos, Tiryns, and elsewhere in Greece (e.g., Iria, Gla, Krisa, Lefkandi, the Menelaion in Lakonia, Korakou), coupled with abandonments at several sites in the Argolid, Corinthia, Lakonia, Messenia, Attica, and Boeotia (e.g., Eutresis, Brauron, Nichoria, Ayios Stephanos, Berbati, Prosymna, Tsoungiza, Zygouries), indicate not only the geographic extent but also the level of devastation involved.[179] This series of disasters, whose broad contemporaneity is not in doubt, nonetheless clearly marks the end of the Mycenaean polities and is widely regarded as the culmination of a long period of unrest beginning in the mid 13th century B.C.E.[180] On Crete and some of the Aegean Islands (e.g., Melos, Siphnos, Naxos, Salamis), various sites were destroyed or abandoned, while others were apparently newly fortified. In the eastern and southeast Aegean, there are some destructions or abandonments in late LH IIIB–IIIC, and, in general, the picture is variable but unclear (indicating a time of change).[181]

As to the cause(s), Dickinson mentions the most commonly cited:[182] foreign threat or enemy attack, internal troubles, natural disaster (earthquakes more commonly cited than climate change), a hypercentralized economy, and the collapse of international trade.[183] In Nowicki's view, not only Crete but also "the whole eastern Mediterranean was opened to sea-raiders and freebooters," the "Sea Peoples" or armed troops from the collapsed Mycenaean state(s).[184] Moody suggests that the period between ca. 1300 and 900 B.C.E. on Crete and in the Aegean and eastern Mediterranean saw extremes of climatic events that must be factored into any account of Late Bronze Age sociopolitical or economic change.[185]

Maran, while noting the likelihood of earthquakes at Tiryns and Midea at the end of LH IIIB (and at Mycenae earlier in the 13th century B.C.E.), argues against any single cause for the crisis, destructions, and abandonments.[186] He suggests that—at least at Tiryns and possibly at Mycenae—the extensive building programs that followed the mid 13th-century B.C.E. destructions were not simply defensive in nature but also aimed at enhancing the power and status of political elites.[187] These costly building measures, however, may have put unacceptable strain on the villages, workers, and warriors of the kingdom, leading eventually to internal disruptions and rebellion, the implosion of the political

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178 See, most recently, Jung and Mehofer 2005–2006; Jung 2009 (with earlier references).

179 E.g., Shelmerdine 2001, 372–76; Deger-Jalkotzy 2008; Middleton 2010, 14–15; Cline 2014, 128–32.

180 Maran 2009, 242; see also Muhly 1992, 11–12; Rutter 1992, 70; Shelmerdine 2001, 372–73; Deger-Jalkotzy 2008, 387.

181 Kanta 1980; see also Deger-Jalkotzy 1998; 2008, 387–88; Karageorghis and Morris 2001; Kanta and Kontopodi 2011; Benzi 2013.

182 Dickinson 2006, 41–6; see also Shelmerdine 2001, 374.

183 Betancourt 1976; Shelmerdine 1987; Kilian 1980, 1996; Drews 1993; Zangger 1994, 207–10; Sherratt 2001; Voutsaki 2001.

184 Nowicki 2000, 225.

185 Moody 2005, 462–65.

186 Maran 2009.

187 See also Iakovidis 1999, 203.

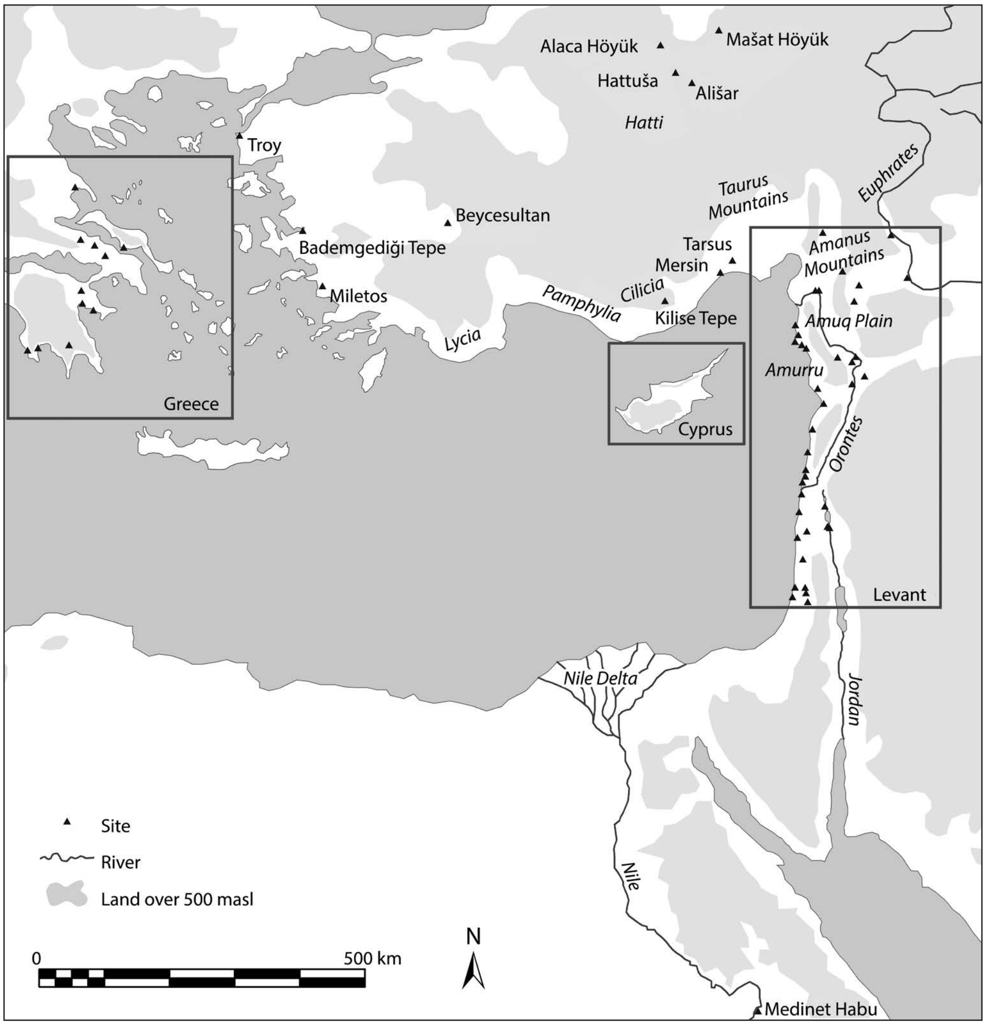

FIG. 7. Map of the region discussed in this article, showing sites and areas mentioned in text.

order, and the collapse of the centralized economy that had sustained the entire system. In other words, Maran sees no outside intervention but a possible link between natural causes and internal stresses, with heavy emphasis on the latter.

Whatever the likelihood of such a scenario at Tiryns and perhaps at Mycenae, Dickinson had already noted that many of these elaborate (re)construction projects would have served to enhance the status of elites, but he questioned whether tax demands or forced labor on the part of elites would have weighed so heavily on their subjects.[188] Moreover, he felt it unlikely that these particular building projects would have bankrupted the palatial economies, as they were completed up to a half-century before the ultimate collapse. Dickinson also dismisses population movements, ethnic or otherwise (e.g., the "Dorian invasion," "sub-Mycenaean culture") as well as any ultimate external cause, suggesting that "any historical interpretation that relies on a picture of massive forces of raiders scouring the Aegean, whether by land or sea, owes more to romance than reality."[189] In the end, however, he suggests, sensibly, that it may have been a combination of internal unrest, growing stresses on the palatial economy, localized but severe drought, famine or even epidemic diseases (for which he sees no evidence), and the loss of viable economic contacts with polities and trade partners in the eastern Mediterranean that had a cumulative effect on the increasing instability of palatial society,

[188] Dickinson 2006, 41, 46.

[189] Dickinson 2006, 50; see also Schnapp-Gourbeillon 2002, 131–82.

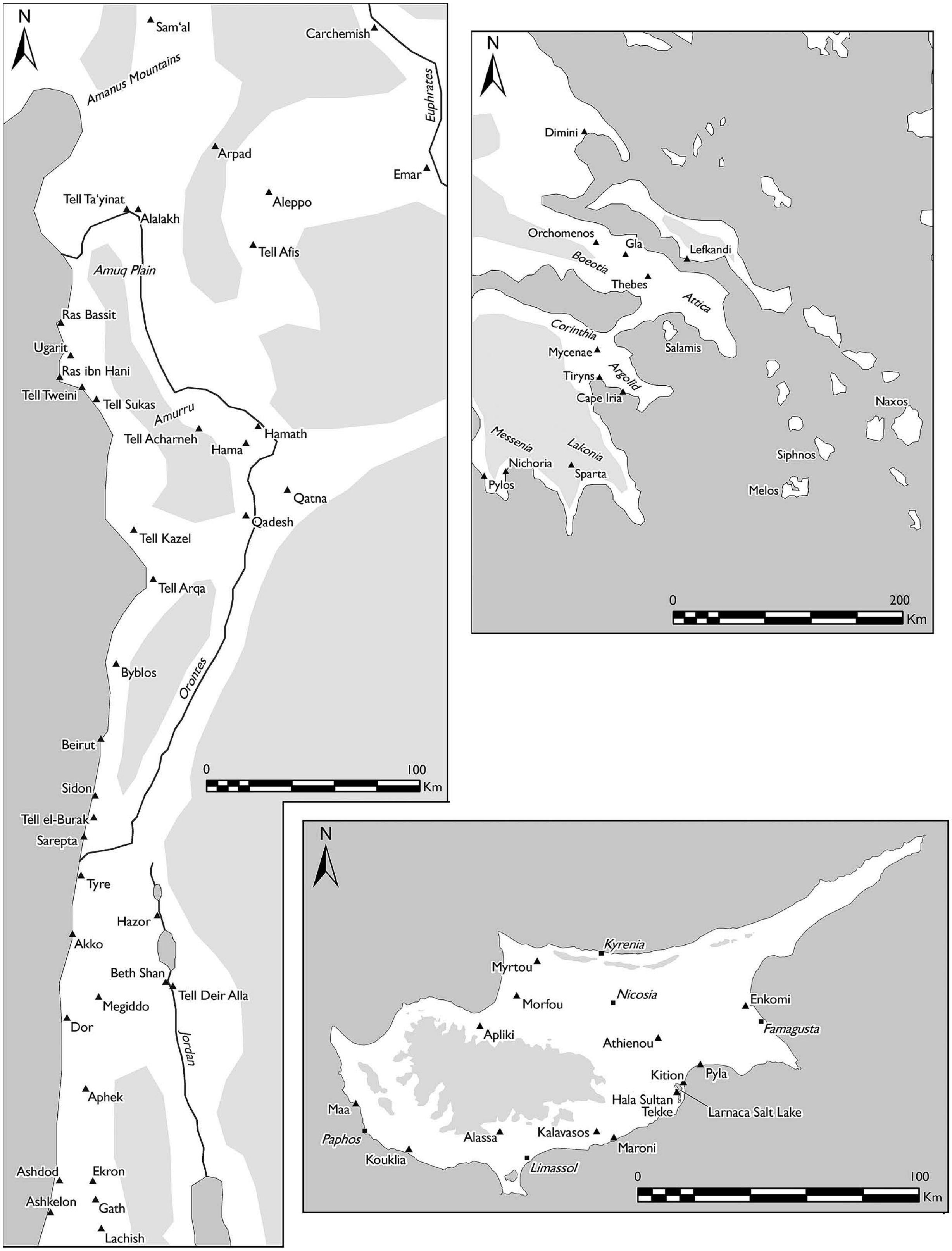

FIG. 7 (continued).

ultimately leading to its collapse.[190] Shelmerdine and Deger-Jalkotzy similarly conclude that a combination of factors—a longer-term process of decline and a series of "precipitating events"—must have led to the collapse of Mycenaean palatial society.[191] We might describe all these views as "tipping point" explanations, and climatic change may well have been one of the contributing factors.

The aftermath, at least, is clear: the palaces and all their related administrative and economic structures, as well as their representational arts and crafts, came to an end; territorial control dissolved; the Linear B writing system went out of use; international trading contacts dwindled, then disappeared, at least for the time being; and the concept of a supreme ruler (the *wanax*) and his/her trappings became the subject matter of myth. All this represents a deep rupture in the politico-economic and ideological system that linked together the Bronze Age Aegean world. Broodbank remarks that in comparison with the crises elsewhere, it was "otherwise small beer, given their peripheral location, modest scale and recent formation."[192] While a distinctive post-palatial culture emerged, it was markedly different from its predecessor, involving lower standards of living but also new kinds of warriors, traders, and raiders, new kinds of tools forged from a new metal, different kinds and points of connectivity, and the "birth pangs of a new social and economic order"[193]—all the stuff of Homeric epics and the coming Age of Iron.

Anatolia

Destruction layers mark the end of several Anatolian sites at the end of the Late Bronze Age: among the best known are Hattuša (Boğazköy), Alaca Höyük, Ališar, Beycesultan, Kilise Tepe, Mašat Höyük, Mersin, Tarsus, and Troy. The timing of these "destructions," however, many of which seem to have been cases of abandonment, is not well established, and at least some sites were reoccupied, or continued to be occupied, in the early Iron Age (e.g., Boğazköy, Alaca Höyük, Troy, Kilise Tepe).[194] The reinterpretation of older excavations as well as newer fieldwork and research have now called into question the sacking and burning of the capital at Hattuša, which challenges the notion that the demise of the Hittite state resulted from invasions—whether by the Sea Peoples or the neighboring Kaška people to the north—rather than from internal disruptions or the emptying and abandonment of the site.[195] Both Muhly and to some extent Hoffner had already questioned any significant role of the Sea Peoples in the destruction of Hattuša, and a series of crucial but controversial documents in Hittite and Hieroglyphic Luwian have been interpreted as indicating a long-term struggle over the Hittite throne between the rulers at Hattuša (Tudhaliya IV, Šuppiluliuma II) and Tarhuntassa in Cilicia (Kurunta).[196] As was often the case during four centuries of Hittite rule in Anatolia, internal rivalries over the succession to the throne threatened the integrity of the state.[197]

Similarly, there is little secure evidence to identify who may have been responsible for the destructions—mainly by fire—at the sites of Alaca Höyük, Ališar, and Mašat Höyük toward the end of the 13th century B.C.E. At Tarsus in Cilicia, the Late Bronze (LB) IIA city was destroyed in a great conflagration about the same time but shortly thereafter was resettled by a "squatter occupation."[198] Although the local pottery shows elements of continuity (with Hittite traditions) as well as change (plain wares and Cilician painted pottery), the architectural remains indicate not only destruction but also decline.[199] The destruction at Tarsus was long attributed to the Sea Peoples, in part because of its location in southern Anatolia very near the Mediterranean coast and in part because of its locally produced Aegean-type pottery, which seems to be related stylistically to LH IIIC on the Greek mainland.[200] At Kilise Tepe in the Göksu River Valley some 100 km farther west, another destruction by fire brought an end to the IIc phase of the "Stele Building"; on the floors of the poorly preserved phase IId rebuilding lay some similar(?), locally produced Aegean-type pottery, dated to ca. 1175–1150 B.C.E.[201] Singer noted the presence of some Aegean-type sherds related to LH IIIC in the Aegean at a couple of sites farther west, on or near the Lycian and Pamphylian coasts; in his view, these may

[190] Dickinson 2006, 54–6.

[191] Shelmerdine 2001, 375–76; Deger-Jalkotzy 2008, 390–92.

[192] Broodbank 2013, 470.

[193] Broodbank 2013, 468.

[194] Bittel 1983.

[195] Glatz and Matthews 2005 (summarized in Genz 2013, 470–72); Cline 2014, 125–26.

[196] Muhly 1984, 40–1; Otten 1988; Hoffner 1992, 48–9; Hawkins 1995; 2002, 145–47; 2009; see also Melchert 2002.

[197] See also Singer 1996.

[198] Goldman 1956, 58–9.

[199] Yalçin 2013.

[200] Sandars 1987, 153–55; Mommsen et al. 2011.

[201] Bouthillier et al. 2014, 106–7.

be related to an Aegean (i.e., Sea Peoples) migration.[202] The notion that Aegean-style pottery found at all these sites in southern Anatolia should be linked to the arrival of Aegean people (as part of the Sea Peoples phenomenon), however, has been challenged.[203]

Bryce argued that most Anatolian sites destroyed at or near the end of the Late Bronze Age were confined to areas east or just south of the Halys River in central Anatolia.[204] He also maintains that very few sites of the Late Bronze Age Hittite world were actually destroyed rather than abandoned. The main exception, of course, is Troy on the northwest coast of Anatolia, where the early 12th-century B.C.E. level (VIIa) was destroyed by a severe fire, with some of its inhabitants lying dead in the street.[205] Whether the perpetrators were Mycenaean Greeks (the legend of Troy) or the Sea Peoples, or neither, is a question that may never be settled. Aslan et al., in fact, argue that the ceramic evidence from Protogeometric Troy is more consistent with local developments within "Aegean interaction spheres" than with an Aegean (or Sea Peoples) migration.[206]

Mountjoy, having examined a wide array of Mycenaean material throughout the islands of the eastern Aegean, suggested that the southernmost islands, including Rhodes, were the most likely location of the kingdom of Ahhijawa known from Hittite texts; she suggested that the activities of the Sea Peoples may have disrupted the unity of this kingdom.[207] More recently, these views have been elaborated. Excavations at the site of Bademgediği Tepe (about halfway between İzmir and Ephesos on the west Anatolian coast) have uncovered notable amounts of locally made LH IIIC pottery, in particular a large painted krater depicting a sea battle.[208] The warriors depicted stand on two, counterpoised ships. In Mountjoy's view, the "hedgehog" helmets worn by these warriors are reminiscent of the feathered helmets associated with some of the Sea Peoples from the Medinet Habu reliefs.[209] Mountjoy, as well as Singer, felt that this early 12th-century B.C.E. krater from coastal western Anatolia provides a key link connecting the Sea Peoples with this area.[210] Such a link, however, remains to be substantiated, not just asserted on the basis of pottery.[211]

With the fall of Hattuša and the destruction or abandonment of other sites, the Hittite state, its administration, and the cuneiform system of writing disappeared from Anatolia, never to be revived. These developments represent a watershed in the history of the ancient Near East. Even so, the aftermath may also be seen as the flourishing of a new political landscape, a new lifestyle, and new technologies, with the communities involved demonstrating a level of cultural and linguistic continuity with the Bronze Age past.[212] To the south and in northern Syria, moreover, "Neo-Hittite" regimes preserved some Hittite artistic traditions—for example, carved architectural reliefs, albeit with different types of "meaning-making" and within a much-transformed sociopolitical environment (discussed further below).[213] As is the case with the crisis elsewhere, however, there is plenty of speculation but no agreement on the causes—proximate or ultimate—of this collapse, as the mute material evidence here plays havoc with myth and political history, not to mention geography and climate.

The Levant

The demise of the Hittite state left a political vacuum in the region south of the Taurus and east of the Amanus mountain ranges—namely, the area of the Amuq Plain (Plain of Antioch) and lands to the east (as far as Aleppo) and south (as far as Hama). There is evidence of both political instability and cultural continuity in this region. Power once centered at Hittite-dominated Carchemish or Aleppo became fragmented in a balkanized political landscape, one that was ultimately (10th to 9th centuries B.C.E.) split between various Neo-Hittite (Hamath, Carchemish) and Aramaean (Arpad, Samʿal) city-states, the former preserving some imperial Hittite traditions in architecture, sculpture,

[202] Singer 2012, 460–61.

[203] Sherratt and Crouwel 1987, 341–46; Sherratt 2013, 624–27; cf. Yasur-Landau 2010, 159–61.

[204] Bryce 2005, 347–48.

[205] For the date, see Mountjoy 1999, 297–301. For the archaeology, see Blegen et al. 1958, 10–13; Korfmann 2006.

[206] Aslan et al. 2014; see also Aslan 2009.

[207] Mountjoy 1998, 60, 63; see also Hawkins 1998. Kelder (2004–2005) provides an exhaustive account of Mycenaean material in central-southwestern Anatolia but suggests that it is unrelated to political or military activity in this region.

[208] Mountjoy 2005, 2011.

[209] But they are perhaps more akin to the headgear seen on the "Warrior Vase" from Mycenae (J. Muhly, pers. comm. 2014).

[210] Mountjoy 2005, 426; Singer 2012, 457–58.

[211] Singer (2013) presents a fuller but nonetheless controversial, indeed debatable, argument.

[212] Harmanşah 2013, 34–5, 46–7.

[213] Hawkins 2009; Sagona and Zimansky 2009, 291; Feldman 2014, 348.

and writing (i.e., Luwian).[214] What happened in this area during the 12th to 11th centuries B.C.E., however, has long been cloaked beneath an archaeological and epigraphic shroud.

Recent excavations at Tell Ta'yinat, however, have shed some new light on the earliest Iron Age in this region. Here it must suffice to say that a growing corpus of epigraphic discoveries from the Amuq, within Cilicia and at Aleppo, have led to the suggestion that a king named Taita may have ruled from Ta'yinat over the Amuq Plain and surrounding regions to the east and south, an area tentatively identified from monumental inscriptions as the "Land of Palistin."[215] On this basis, it is speculated that "Palistin" (a new reading of Hieroglyphic Luwian Padasatini) may somehow be linked to the Peleset of the Egyptian records—that is, the Philistines—and that, accordingly, one group of the Sea Peoples may have established a powerful kingdom in the Amuq during the 11th century B.C.E.[216] As was the case at Tarsus and in Cilicia, the early Iron Age I levels at Ta'yinat (and in the north Orontes River valley generally) have produced a large assemblage of locally produced Aegean-type pottery and other purportedly Aegean-type cooking jugs, figurines, and cylindrical loomweights.[217] Janeway, however, has now clarified that the LH IIIC bowl assemblage at Ta'yinat shows close stylistic affinities with LC IIIB or IIIC material.[218] Linking all this Aegean-type material to the arrival of the Sea Peoples (in the "land of Palistin"), however, is no more demonstrable in this case than it is in Cilicia, or in the Philistine towns of the southern Levant, about which more below.[219] Singer, moreover, called into question the entire chronological schema as constructed for Tell Ta'yinat and argued that it is impossible to fix the dates of the reign of Taita (or two rulers named Taita) within the early Iron Age archaeological sequences known from sites in Cilicia and the Amuq.[220]

From Ugarit in the north to Ashkelon in the south, however, a series of destructions or abandonments mark the final Bronze Age levels of numerous (but certainly not all) coastal and near-coastal sites in the Levant.[221] In the north, the major site of Ugarit suffered near-total destruction; dwellings were abandoned, then pillaged and burned. No urban settlement ever rose again on the site, although Callot has defined an architectural phase built atop the ruins.[222] Given the dire straits heralded in the textual evidence, along with the massive destruction level at the site (up to 2 m high in places),[223] most scholars accept the proposition that the city fell to enemy attack by the Sea Peoples.[224] The date of this conflagration is reasonably well established at some point between 1200 and 1175 B.C.E. More exact dating—between ca. 1193 and 1186 B.C.E.—has been proposed on the basis of (1) a synchronism with Egypt (the death of the chancellor Bay) in the fifth regnal year of Siptah,[225] documented in an Akkadian letter, and (2) an astronomical observation recorded in an Ugaritic text.[226]

To the north of Ugarit, at Ras Bassit, and to its south, at Ras Ibn Hani, destruction levels are also recorded toward the end of the Late Bronze Age, but both sites were reoccupied shortly thereafter.[227] Unlike the case at other nearby sites, Ras Ibn Hani has a large amount of locally made Aegean-style pottery and loomweights found in the earliest Iron Age I levels, but the architecture is decidedly local and domestic in character.[228] According to du Piêd, shapes and decoration of the Aegean repertoire from Ras Ibn Hani resemble those of the "Mycenaean IIIC: 1 Monochrome (with monochrome painted decoration)" pottery found at various sites in the southern Levant, which in turn show close connections to the Aegean-style repertoires from Cyprus and Cilicia.[229] Although typically taken to represent dietary changes associated with the settlement in the southern Levant of "Philistine immigrants" from the Aegean or Cyprus, in the central and northern Levant continuity with Late Bronze Age cooking traditions is the rule, and at Ras Ibn Hani there is no

[214] Hawkins 2009, 164–65; Pfälzner 2012, 781–82; Osborne 2013.

[215] Harrison 2009; Hawkins 2009, 2011; Singer 2012.

[216] Janeway 2006–2007; Galil 2013, 160–62.

[217] Janeway 2006–2007; Harrison 2009, 181–83; 2010, 89.

[218] Janeway 2011, 177.

[219] E.g., Middleton 2015; see also Yasur-Landau 2010, 279–81.

[220] Singer 2012, 466–72. Cf. Galil (2014, 81–6) for a valiant attempt at dating two kings named Taita.

[221] Caubet 1992.

[222] Yon 2006, 22; Callot 2008.

[223] Yon 1992, 117.

[224] E.g., Liverani 1995, 115; Singer 1999, 730–31.

[225] 1202 B.C.E., following Schneider 2010.

[226] Freu 1988; Singer 1999, 713–15, 729; Dietrich and Loretz 2002; Jung 2010, 177; Gilmour and Kitchen 2012, 17.

[227] Caubet 1992, 127; Cline 2014, 112 (both with further references).

[228] du Piêd 2011, 219–20, 226.

[229] Dothan and Zukerman 2004; du Piêd 2011, 226.

evidence for a large-scale immigration of new "ethnic" groups in the Iron Age I period.[230]

Inland from Ugarit on the bend of the Euphrates, the site of Emar—with extensive Late Bronze Age remains—was probably destroyed (and suffered famine?) about the same time, if not a half-century earlier.[231] The perpetrators, however, especially if an earlier date is correct, are more likely to have been local (TAR.PI/*tarwu*) or regional groups (e.g., Hurrians [or Assyrians?], Aramaeans) than the Sea Peoples.[232] At Alalakh (Tell Atchana), closer to the coast, the destruction of level I—argued by Woolley to date to the end of the Late Bronze Age in the attempt to establish a Sea Peoples' presence at the site—has now been redated to ca. 1300 B.C.E.; it resulted in near-total abandonment of the site.[233] The recent excavations at Tell Atchana have uncovered Aegean-type pottery stylistically related to LH IIIC on the Greek mainland and possibly some Handmade Burnished Ware in a few thin strata of ephemeral surface deposits, which the excavator interprets as a localized and short-lived reuse of the site during the mid 12th century B.C.E., rather than a Sea Peoples' resettlement, as Woolley envisioned.

At Tell Tweini (ancient Gibala?), some 40 km south of Ugarit on the Syrian coastal plain (1.5 km from the sea), a major destruction evident in a fire-generated ash level (level 7A) over at least part of the site has been dated precisely, if rather uncritically, to 1192–1190 B.C.E. and attributed to the Sea Peoples.[234] As noted above, this dating is in fact unlikely on the basis of a more critical assessment of the available radiocarbon evidence. The excavators themselves tend to be more cautious, suggesting elsewhere a destruction date sometime during the first quarter of the 12th century B.C.E.[235] In any case, the site was immediately resettled and, while new pottery styles were introduced (handmade and burnished cooking pots related to northern Levantine *céramique à la stéatite*, locally produced Aegean-type pottery), they may not have appeared simultaneously and thus are not regarded as evidence for incoming migrants.[236] Moreover, as Cline cautions, any evidence for the Sea Peoples' involvement here (e.g., handmade cooking wares, Aegean-type pottery, architecture, and loomweights) is circumstantial at best.[237] Some 6 km farther south, at Tell Sukas, the LB II level also ended in a major conflagration.[238]

About 80 km farther south in modern-day Lebanon, also on the coastal (Akkar) plain some 3.5 km from the sea, lies the site of Tell Kazel (ancient Ṣumur?). Level 5 at Tell Kazel was also destroyed by a "fierce fire"—evident in a thick layer of ashes—dated to the very end of the Late Bronze Age.[239] Like many other coastal Levantine sites, after a short period of abandonment, the site was reoccupied in the Iron I period.[240] The excavator attributes some of the subsequent pottery innovations and imports (e.g., "Handmade Burnished Ware," "Mycenaean-type" cooking pots) to "certain groups of the Sea Peoples," not just here but also at Ras el Bassit and Ras Ibn Hani.[241] Jung, who has undertaken more detailed studies of the pottery from the site (Aegean-type, imported, and locally produced, as well as handmade and burnished wares), suggests that the final destruction of Tell Kazel, preceded by smaller-scale migrations from the Aegean if not Italy, can be ascribed to the Sea Peoples, mainly because Ramesses III's year 8 inscription mentions the destruction of Amurru.[242] In our view, this not only represents a classic case of "pots equal people" but also assumes we can read documentary evidence (in this case Ramesses' propaganda) directly into material culture. Moreover, it is worth mentioning in this case that the Egyptians may already have destroyed the "land of Amurru" during Ramesses III's fifth regnal year, prior to the presumed advance of the Sea Peoples.[243]

Several other Lebanese sites along the coast, both within the area already discussed (e.g., Tell Arqa in the southern Akkar Plain) and to the south (e.g., Sarepta, Tyre), have no destruction levels that can be dated to the late 13th to early 12th centuries B.C.E. During the Late Bronze Age, the site of Tell Arqa

[230] du Piêd 2011, 227–28.

[231] Arnaud 1975; Adamthwaite 2001, 272 n. 41; Cohen and d'Alfonso 2008, 14–15, 22; Divon 2008, 104; Pfälzner 2012, 782.

[232] Adamthwaite 2001, 261–72.

[233] Woolley 1955, 375; Yener 2013, 17–19.

[234] Kaniewski et al. 2011, 8 June; 2013, 14 August, fig. 2.

[235] E.g., Bretschneider and Van Lerberghe 2008; Vansteenhuyse 2010, 40; Bretschneider et al. 2011, 77–8.

[236] Vansteenhuyse and Bretschneider 2011, 187, 190; Bretschneider et al. 2014, 353–54.

[237] Cline 2014, 113, 156–57.

[238] Lund 1986, 12; Riis et al. 1995.

[239] Badre 2006, 93.

[240] Badre 2011a, 220–21.

[241] Badre 2011b, 156.

[242] Jung 2006, 203–7; 2010, 177–78; 2012, 105.

[243] Kahn 2010, 16–18.

(Irqata?) gradually fell into decline and was no more than a small village by the end of the period.[244] A small amount of pottery from Tell Arqa suggests foreign origins ("Handmade Burnished Ware," "Aegean-style" cooking pots); the latter come from the upper layers of level 11 at the site, tentatively dated to the end of the 13th or beginning of the 12th century B.C.E., but with no evidence for any destruction at that time.[245] The evidence from sites such as Beirut, Byblos, Sidon, and Tell el-Burak is more equivocal (or not yet available for the Late Bronze Age) and thus is difficult to interpret in terms of a destruction carried out by the Sea Peoples. In fact, it is fair to say that most scholars remain skeptical about the presence of Sea Peoples in Lebanon.[246] If it were not for the disruption in Cypriot and Mycenaean imports and the introduction of wares like "Handmade Burnished" and locally made Aegean-type pottery, one would assume overall Canaanite cultural (and material culture) continuity from the 13th to 11th centuries B.C.E.[247]

Sites from inland Syria (e.g., Tell Afis, Tell Acharneh/Tunip, Tell Mishrifeh/Qatna, Hama) seem to tell a different story, one in which a series of earlier (mid 14th to 13th century B.C.E.) destructions may have precipitated the eventual collapse seen at the end of the Late Bronze Age.[248] At Qatna, the so-called Royal Palace was destroyed ca. 1340 B.C.E., and other palatial structures at the site were abandoned; although occupation continued at Qatna, it is regarded as "scant and impoverished" throughout the rest of LB II.[249] Farther north, at Tell Acharneh (Tunip?), Late Bronze Age material is still scant, but the large storage jars uncovered in the only main structure thus far excavated seem to be contemporary with those seen at Qatna and Hama (i.e., 15th to 14th century B.C.E.); the structure itself was eventually destroyed, but what took place afterward remains unclear.[250] Farther north again, Tel Afis seems to have had a Late Bronze Age urban center with sophisticated architecture but mainly local, mass-produced pottery. Toward the end of LB II, the "high quality" level Vb residences on the site were destroyed; although reconstructed shortly thereafter, the domestic units were entirely different, and the pottery includes what the excavator terms "Mycenaean IIIC:1" or "Aegeanized" vessels, thus raising the issue of newcomers at the site and, in his eyes, the possibility of Sea Peoples' involvement.[251]

Although LB IIA occupation at the site of Tell Nebi Mend (Qadesh) showed substantial building activity, perhaps reflecting "renewed prosperity," there is no published material or architectural evidence for the importance of Qadesh during the Late Bronze Age.[252] Other studies indicate that the destruction of what may have been an important public building (in which five cuneiform tablets were found) occurred in the latter half of the 14th century B.C.E.[253] Millard dated all five of the cuneiform tablets—and thus the destruction level in which they were found—to the end of the 14th or early in the 13th century B.C.E.[254] While the full archaeological circumstances of this destruction must await the final excavation report, there is at this time no indication of the site's destruction at the end of the Late Bronze Age.

When we reach the southern Levant, however, there are a series of destruction levels in sites dated to the period ca. 1200 B.C.E.: for example, Tel Akko, Beth Shean, Megiddo, Lachish, Hazor, Ekron, Ashdod, Ashkelon, and Tell Deir ʿAlla (Jordan). Cline rightly emphasizes that, as is the case elsewhere along much of the Levantine coast and coastal plain, it is never clear precisely when these sites were destroyed or who may have destroyed them.[255] Although sites such as Tell Deir ʿAlla, Akko, and Beth Shean have datable (Egyptian) objects in their respective destruction levels, others—like Megiddo and Lachish—have been so thoroughly but variously excavated by different teams over a long period of time that the timing and even the number of the relevant devastations remain subject to debate. Both sites seem to have destruction levels—stratum VIIA at Megiddo, stratum VI at Lachish—significantly later than the ca. 1200 B.C.E. benchmark

[244] Thalmann 2010, 100.

[245] Charaf 2011, 207–8.

[246] Lehmann 2013, 320–28 (with further references).

[247] Charaf 2007–2008, 87–9.

[248] Morandi Bonacossi 2013, 128.

[249] Pfälzner 2012, 778–79; Morandi Bonacossi 2013, 119–21. For a discussion of the relevant pottery sequences in operations J and K at the site, see Iamoni 2012.

[250] Fortin and Cooper 2013, 156–58.

[251] Venturi 2013, 236–38. Cf. du Piêd (2011, 226), who suggests that two "Aegean style" kraters from Afis were likely imports from Ras Ibn Hani.

[252] Bourke 1993, 189; Pfälzner 2012, 780.

[253] Parr 2006, 144; Millard 2010, 226.

[254] Millard 2010, 227. Cf. Singer (2011), who attempts to assign two of the tablets more specifically, to 1285–1275 B.C.E.

[255] Cline 2014, 114–23.

indicated elsewhere: namely, ca. 1130 B.C.E.[256] However, in neither case, not even for the possibly earlier (ca. 1200 B.C.E.) destruction levels—stratum VIIB at Megiddo, stratum VII at Lachish—is there any clear evidence for the perpetrators of these disasters or whether they might have been Sea Peoples, Egyptians, Israelites, or other Canaanites.[257]

Some of the key "Philistine" sites on the southernmost Levantine coast or coastal plain that have been excavated and reasonably well published—Ashdod, Ekron (Tel Miqne), Gath (Tell es-Safi), and Ashkelon—were at least partially destroyed at the end of the Late Bronze Age (more "peaceful" change at Ashkelon?). The new settlements on these sites reveal notable changes in material culture: pottery, architecture, hearths, household goods, and the like.[258] There is wide consensus in the literature that—alongside indigenous Canaanite traditions—the distinctively new material assemblages mark the arrival and settlement of the Philistines[259] and perhaps other groups of Sea Peoples farther north.[260] As Cline has emphasized, however, even if the Aegean-style wares at these sites represent the physical remains of the Sea Peoples, their overall material records have closer links to Cyprus than to the Aegean.[261] Rutter maintains the same, pointing out that the "functionally restricted nature" of the earliest Philistine assemblages from Tel Miqne and Ashdod—not least the apparently exclusive use of Canaanite jars as opposed to Aegean transport stirrup jars or Cypriot pithoi—provides no support for the notion of an Aegean ethnic element among the Philistines at these sites.[262] While some scholars maintain that similarities between Cypriot and Philistine pottery point to the common origin of Aegean settlers on Cyprus and in the southern Levant,[263] others have suggested that the Philistine "migration" originated in Cyprus or Cilicia.[264]

Sherratt, by contrast, argued that much of the Aegean-type pottery (typically termed "Mycenaean IIIC:1b," or "Philistine 1" in Israel) found throughout the eastern Mediterranean was produced and distributed by freelance maritime merchants based on or near Cyprus.[265] She regarded some of the early Philistine pottery in Israel ("Mycenaean IIIC:1") as "a functionally determined selection of the Cypriote White Painted Wheelmade III repertoire."[266] Barako countered that it is not only Philistine pottery (Mycenaean IIIC:1b) that points to the arrival of new migrants into the southern Levant by sea but also other material goods and practices, such as Aegean-style loomweights, figurines and cooking pots, pebbled hearths and hearth rooms, incised scapulae, and the high percentage of pig in faunal assemblages.[267] Yasur-Landau expands the argument in terms of both material and social practices, focusing on cooking and storage wares, textile production, and the organization of domestic space.[268] Middleton harshly critiques the entire narrative that surrounds the Philistine's supposed Mycenaean origins, not just as "historical myth" but also with respect to all the material categories typically cited to underpin the presumed "migration": pottery, dietary practices (faunal material), hearths and cooking tripods, figurines, linear writing, "bathtubs," and textiles.[269]

In sum, efforts to pinpoint the origin and identity of the Philistines remain at best equivocal, as do arguments that their passage to the southern Levantine

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[256] Cline (2014, 114–21) provides an excellent summary, with references to all original excavations; see also Langgut et al. 2013, 165–66. Level VIIA at Megiddo refers to the Chicago excavation system and equates approximately with LB III and levels K-7/6 and H-13/12 in more recent work (Toffolo et al. 2014). Based on the most recent evidence, this LB III phase at Megiddo only starts during the 12th century B.C.E., while the end of the period is later again, around or after ca. 1100 B.C.E. (Toffolo et al. 2014, 241, fig. 8).

[257] Fritz 1987, 90–1; Dever 1992, 107–8; Weinstein 1992, 147–48. On the Egyptians, see Gilmour and Kitchen 2012. For Megiddo, note again that the latest analysis places the end of level VIIB after 1200 B.C.E., in the mid to even later 12th century B.C.E. (Toffolo et al. 2014, 241, fig. 8).

[258] Master et al. 2011, 276–77; Cline 2014, 122 (with further references).

[259] E.g., Stager 1995, 348; Bunimovitz 1998, 2011; Ben-Shlomo et al. 2008, 226–27; Yasur-Landau 2010, 2011; Maeir et al. 2013; cf. Middleton 2015.

[260] E.g., Šikila at Dor, Šerden at Akko (Gilboa 2005, 48–52; Yasur-Landau 2010, 170–71; Sharon and Gilboa 2013; Stern 2013).

[261] Cline 2014, 157–58 (again with detailed references).

[262] Rutter 2013, 561 n. 22.

[263] E.g., Stager 1995; Bunimovitz and Yasur-Landau 1996; Bunimovitz 1998.

[264] E.g., Killebrew 2006–2007; Stern 2013, 63.

[265] Sherratt 1998, 301–7.

[266] Sherratt 2003, 45. Most Philistine pottery was locally produced; see, e.g., Ben-Shlomo 2006; Ben-Shlomo et al. 2008.

[267] Barako 2000, 2003; see also Faust and Lev-Tov 2011, 14–16; cf. Maeir et al. 2013.

[268] Yasur-Landau 2010, 227–81; 2011.

[269] Middleton 2015.

coast involved large-scale migrations.[270] On the basis of a distinctive type of monochrome pottery and strong material culture associations with Cyprus, Stern imaginatively distinguishes one large "wave" of migrating "northern Sea Peoples" (e.g., at Tell Qasile, Dor, Akko) from their southern counterparts, as well as from the Philistines.[271] Singer took the argument even further: "The migrations of the peoples whom we conveniently call the 'Sea Peoples' constitute, in my opinion, the largest recorded case of population movements in the Mediterranean before the Migrations Period of the Late Antiquity."[272] However one regards Singer's views on this matter, the destruction levels at the soon-to-be Philistine sites, as well as Phil-istine involvement in such episodes, have been called into question. Sharon and Gilboa, for example, argue that "the cultural sequence at Dor in the early Iron Age is characterized by continuity rather than upheavals, and it essentially documents the gradual transformation of the Late Bronze Age Canaanite culture into the Iron Age Phoenician one."[273] Previous suggestions of the Sea Peoples' impact on the local material culture at Dor, therefore, clearly need reformulation.

According to Yasur-Landau,[274] at Ashkelon the migrants settled on a deserted site atop the unfinished remains of an Egyptian garrison; at Ashdod there is no clear evidence for any violent destruction (as opposed to simple cooking remains) but rather a "peaceful transition"; at Ekron, a small Canaanite village was indeed destroyed but was replaced by another Canaanite village before the migrants arrived. In Yasur-Landau's view, having cited a wide range of related evidence, all this signals peaceful interactions, a "balance of power" between the local Canaanites and the migrant Philistines, "joint foundations of Aegean migrants and local populations, rather than colonial enterprises."[275] Based on large numbers of "Aegean style cooking jug(s)" together with the continued use of local Late Bronze Age cooking pots in early 12th-century B.C.E. levels at Ashkelon, Master suggests that differences in foodways are not necessarily tantamount to social or cultural boundaries.[276] All this signals a more peaceful process involving the hybridization of different cultures; it bears little relation to the picture of militant Sea Peoples swamping the original Canaanite culture as part of a larger process of the collapse of Late Bronze Age societies throughout the eastern Mediterranean.[277]

Cyprus

During if not just prior to the Protohistoric Bronze Age (ProBA) 3 period (ca. 1200–1050 B.C.E.) on Cyprus, various monumental structures were destroyed at several sites: Enkomi, Kition, Kouklia Palaipaphos, Myrtou Pigadhes, Maroni Vournes, Kalavasos Ayios Dhimitrios, and Alassa Paleotaverna. At some point during the same stretch of time, some town centers were abandoned: Maroni, Ayios Dhimitrios, Alassa, Hala Sultan Tekke Vyzakia, Morphou Toumba tou Skourou, Maa Palaeokastro, and Pyla Kokkinokremnos. Destructions and abandonments in the coastal centers also affected inland settlements: ceremonial centers as well as agricultural and mining or pottery-producing villages were disrupted, and most of them were also abandoned: for example, Myrtou Pigadhes, Athienou Bamboulari tis Koukounninas, and Apliki Karamallos.[278] This scenario, however, involved a process that unfolded over a period of some 100–150 years from initial abandonments in (late) LC IIC (e.g., Maroni and Kalavasos) to those substantially later in LC IIIA; in between there is little sign of collapse (rather the reverse) at key LC IIIA sites, such as Enkomi, Kition, and Kouklia Palaipaphos. Nonetheless, these indisputable disasters clearly indicate a breakdown in social and economic order on the island, while retraction in the wider eastern Mediterranean politico-economic system also would have affected Cypriot elites who had depended on it for access to exotic goods as well as the raw materials that followed in their wake. Even so, the centralized politico-economic system of the ProBA overall had also embraced more competitive, independent traders who may have buffered the island from the most severe effects of the collapse.[279]

As to the perpetrators of the destructions and abandonments, Muhly long ago expressed an opinion that

[270] Maeir et al. 2013; see also, e.g., Stager 1995; Barako 2003; Yasur-Landau 2010, 337–38; 2011, 252–53; cf. Middleton 2015, 46.

[271] Stern 2013, 63–4.

[272] Singer 2012, 459.

[273] Sharon and Gilboa 2013, 395.

[274] Yasur-Landau 2012, 194.

[275] Yasur-Landau 2010, 220–27; 2011, 252–53; quotation from 2012, 195; see also Fritz 1987, 97–8; Ben-Shlomo et al. 2008, 240; Hitchcock and Maier 2013, 51–4.

[276] Master 2011, 260–64.

[277] Among others, see Maeir et al. 2013; Bunimovitz and Lederman 2014, 257; Cline 2014, 160.

[278] For full references, see Knapp 1997, 54–5, table 2.

[279] Sherratt 1998, 301–2; see also Manning and DeMita 1997.

no subsequent work has been able to counter: "it is no longer possible, I would argue, to find support for any theory that attempts to identify Philistines or any other group of the Sea Peoples in the archaeological record as known from Cyprus at the end of the Late Bronze Age."[280] The so-called Mycenaean colonization of Cyprus was neither Mycenaean nor a colonization.[281] While the series of destructions or abandonments at Cypriot sites around the end of the 13th or the beginning of the 12th century B.C.E. seems clear enough, the time sequence involved is uncertain, and it remains unclear who may have been responsible. Baurain and Vanschoonwinkel argued that the island may have been colonized by Trojans, or perhaps the Lukka or Sea Peoples, along with immigrants from the Aegean.[282] Negbi felt that both Aegean people and Phoenicians migrated to the island during the 12th century B.C.E.[283] Sandars postulated that refugees from Ugarit, if not from Anatolia (Lukka, Carians, Mycenaeans from Miletos), formed part of the demographic mix on 12th-century B.C.E. Cyprus, while Åström posited an amalgamation of Minoan, Mycenaean, Syro-Palestinian, and Anatolian ethnic elements.[284] Finally, we certainly cannot rule out internal causes: Sherratt, for example, suggested that the "urban coastal moguls" of LC III Cyprus ran an "aggressively open economy" that undermined the elite-dominated, centralized politico-economic system.[285]

The most detailed arguments to be made for what Jung terms a "Mycenaean migration" are to be found in his recent studies on Aegean pottery from Enkomi, Pyla Kokkinokremos, and Maa Palaeokastro. He argues that at Enkomi and Maa, wheelmade, flat-based Mycenaean cooking pots replaced local Cypriot handmade, round-bottomed cooking pots.[286] At Enkomi, Mycenaean-type shallow bowls and Mycenaeanizing bowls of Cypriot shape common in level IIB drop to insignificant numbers in level IIIA, being replaced by other, Mycenaean-type deep bowls and shallow, angular, carinated bowls.[287] Jung argues for radical changes in local, Cypriot patterns of cooking and consumption, together with the appearance of constructed hearth platforms.[288] He also notes in passing that collectively used chamber tombs (Cypriot) are no longer the norm, and he mentions certain "novelties" in architecture (most of which, however, are either local or Levantine in origin, not Aegean).[289]

Jung interprets all these materials, but essentially the pottery, as evidence for "a considerable number of immigrants from the Aegean."[290] He acknowledges a strong local element at Enkomi at the beginning of LC IIIA, which was gradually replaced, only to re-emerge in LC IIIB. At Pyla, he sees little evidence of overseas immigrants but notes the close associations with Crete and a "considerable number" of Aegean imports.[291] For Maa, he sees various elements (pottery, architectural features, constructed hearths) indicating strong Aegean influence but also a "marked indigenous cultural element" even stronger at Maa than at Enkomi level IIIA.[292] Like Karageorghis and Demas before him, his main conclusion is that, at Maa, a mixed Cypriot-Aegean population inhabited the site.[293]

Beyond calling for further detailed pottery studies and provenance analyses on the Mycenaean-style cooking pots from Enkomi and the Canaanite jars from Maa and Pyla, all of Jung's detailed pottery analyses from these sites (and others) confirms what was assumed in principle before. With respect to the presence of Sea Peoples on Cyprus, however, he mentions them only in the context of the destruction levels at Tell Tweini and Tell Kazel in Syria,[294] points already critiqued earlier in this paper.

In another recent paper, Karageorghis quotes at length Jung's conclusions, accepting his arguments, which in most respects follow Karageorghis' own.[295] He castigates those who interpret the material in different ways, arguing, "we better put the emphasis on properly identifying and dating the archaeological record before we attempt theorizing. The recent work of Reinhard Jung for Enkomi and others may serve as an example."[296] Our only response is that we can

[280] Muhly 1984, 49.
[281] Steel 2004, 187; Voskos and Knapp 2008; Iacovou 2013b.
[282] Baurain 1984, 355; Vanschoonwinkel 1991, 454.
[283] Negbi 2005.
[284] Sandars 1987, 153–55; Åström 1998.
[285] Sherratt 1998, 301–2.
[286] Jung 2011; 2012, 112–17 (his terminology).
[287] Jung 2012, 112–13.
[288] Jung 2011, 70.
[289] Jung 2011, 70; 2012, 116.
[290] Jung 2011, 69–70.
[291] Jung 2011, 64–5, 70.
[292] Jung 2011, 71.
[293] Karageorghis and Demas 1988, 261–66.
[294] Jung 2011, 65.
[295] Karageorghis 2013, 127–28.
[296] Karageorghis 2013, 130.

best advance research and knowledge in archaeology, on Cyprus and elsewhere, by dissolving this artificial separation between data, methodology, and theory. Instead, we should look to common ground where theory interacts with and is infused by data, thus no longer separating the "what" from the "how" of material things.[297] Despite Jung's meticulous work on pottery that spans the LC IIC–IIIA period (it must be reiterated, however, that pottery does not equal people), there are far more elements of material culture that must be considered in any discussion of mobility, migration, and cultural change. We cannot rule out, and Jung does not rule out, internal developments for some of the changes seen on Cyprus at the end of the Late Bronze Age. No doubt there was an influx of Aegean migrants, but in our view this was not on the scale that he and others envision, either on Cyprus or in the southern Levant.[298] Demographic realities and available transport infrastructure alone render implausible most extreme migration hypotheses.

In any case, three large coastal or near-coastal towns—Enkomi, Palaipaphos, Kition—survived the crisis and soon emerged as new centers of authority, displacing the earlier ones and managing new Cypriot contacts emerging overseas, from the Levant to the central Mediterranean.[299] Moreover, there is solid evidence of social resilience and cultural continuity throughout the 12th and into the 11th century B.C.E. in everything from pottery styles and techniques, architecture and town plans, tomb use, and religious practices to metalworking technologies and industrial intensification.[300] Cyprus thus seems to have made tactical as well as commercial adjustments to the widespread collapse, and as a result its economy remained integral to Mediterranean trade and interaction during the 11th–10th centuries B.C.E. Like Muhly long before us, we find no evidence to support the presence of Philistines or other Sea Peoples in the Late Bronze Age archaeological record of Cyprus.

AGENTS AND PROTAGONISTS

Many state-level polities of the Late Bronze Age—from the Aegean to the Levant, and from Anatolia in the north to Egypt in the south—went into decline within a few decades either side of 1200 B.C.E. Given the ever-shifting ground on which Egyptian chronologies, astronomical or otherwise, are based,[301] recent uncritical radiocarbon analyses related to the widespread Late Bronze Age "crisis" provide spuriously precise dates (e.g., 1192–1190 B.C.E. at Tell Tweini in Syria, 1185 in Canaan and the southern Levant, 1188–1177 in the Nile Delta).[302] Accepting that the crisis occurred sometime during the late 13th to early 12th centuries B.C.E., the aftermath is generally clear: several palatial regimes that had been intimately involved in the transport and exchange systems that characterized the previous 300–400 years disintegrated, while other, smaller regional polities emerged in their place. Although multiple, even contradictory causes for these developments have been suggested, few scholars have attempted to offer a coherent, overarching explanation that might account for all the economic, sociocultural, and political changes that seem evident throughout this period. Foremost among the latter are Sandars and Cline.[303] In this study, we have sought to augment and update Sandars' nearly 30-year-old work and to assess all the relevant evidence—documentary, archaeological, climatological, chronological—in a more critical and conclusive manner than Cline's recent work, which was, unlike Sandars' volume, written for a more popular audience.

The most commonly cited cause stems from the imagery and account by Ramesses III of Egypt's defeat of the Sea Peoples. In Roberts' perhaps singular view, the main purpose of these reliefs and inscriptions was not to record a hostile invasion but rather to embellish the actions of Ramesses III in a manner that accorded with the Egyptian worldview.[304] Thus, the pharaoh was the central character of the narrative, not his enemies: Ramesses is portrayed as an imposing, focal figure, while his adversaries are "minor characters," the suffering subjects of Egyptian domination. The villains are portrayed as a group of wayward warriors—mariners, pirates, and brigands—whose accompanying ships are depicted only once in any detail, in reliefs on the outer walls of the Ramesside temple at Medinet Habu.[305] These ships look suspiciously similar to the smaller-

[297] After Olsen 2012, 100.

[298] See also Voskos and Knapp 2008; Middleton 2015, 46–9.

[299] Knapp 1990; Gilboa 1998.

[300] Iacovou 2005, 2012; Knapp 2013, 451–65 (with further references).

[301] E.g., Schneider 2010; Huber 2011; Aston 2012–2013; Ritner and Moeller 2014; Wiener 2014.

[302] Kaniewski et al. 2011, 8 June; Cline 2014, 113.

[303] Sandars 1987; Cline 2014.

[304] Roberts 2009, 60.

[305] Wachsmann 2000, 105–14, fig. 6.1–8.

capacity, independent vessels that came to characterize much of Iron Age shipping and commerce.

As to the Sea Peoples themselves, certain of their element were known from documentary evidence as early as the 14th century B.C.E., and they persisted as late as the 11th century. Hitchcock and Maeir have recently suggested that they were pirates: disenfranchised warriors, skilled seamen, mercenaries, mutineers, and refugees who emerged in the face of exploited peasant labor and the tumultuous downturn in politico-economic conditions at the end of the Late Bronze Age.[306] In our view, whoever they were and wherever they came from, they were merely a symptom, not the cause, of the Late Bronze Age collapse. No doubt external factors like the Sea Peoples played a part in these disruptive times, but so, too, did internal troubles—social, political, economic—throughout the eastern Mediterranean. And, as we have seen, climatic and other natural factors have again been summoned to the court of inquiry.

The ambiguity of the documentary and archaeological data and the imprecision of the climatological and chronological evidence make it difficult to separate cause from result. On the Mediterranean coasts and at sea, brigandage and piracy may have accelerated the demise of international trade. Once ports and harbors were devastated, there would have been no place left for traders (and thus for pirates) to conduct their business. What the hyperbole of the Egyptian monuments record in their own style and image is the end of a long chain reaction: along with the collapse of towns, city-states, and kingdoms and the demise of the highly specialized production and trade networks in which they were involved, a flurry of "migrations" took place in the 12th to 11th centuries B.C.E.: Aramaeans and Neo-Hittites in the northern Levant, Israelites in the southern Levant, and at least some Aegean people on Cyprus, if not in Cilicia, the Plain of Antioch, and the southern Levant. The new, quite distinctive material culture (esp. locally made Aegean-style pottery) found in coastal or near-coastal sites of the southern Levant has been seen as marking the arrival and settlement of the Philistines and perhaps other groups of Sea Peoples farther north (e.g., Šikila at Dor, Šerden at Akko, Aegean elements at Tell Tweini and in Cilicia and the Amuq Plain). On the basis of a complex linguistic-cum-historical discussion, Singer even proposed a close link between Plst-Pelastoi (Philistines)/Pelasgoi (Pelasgians) and T(w)r(w)s/Tyrsenoi (Etruscans) (i.e., the Plst and Trs of the Egyptian sources), arguing that the origin of the Philistines must have been somewhere in northwest Anatolia.[307]

But what can we really say about the identity of the people who lay behind such ethnica, above and beyond these overarching propositions? Here we confront two dilemmas: (1) all the imponderables involved in isolating "ethnic" groups in the material record,[308] and (2) the problem of trying to compare or juxtapose data sets that are in large part incompatible or contradictory. Ancient documentary evidence, written or composed for specific, often propagandistic purposes by literate rulers or social elites in largely illiterate societies, cannot be taken as historical fact, nor should it be equated directly with archaeological strata, sequences, or site destructions. Bunimovitz discussed the tyranny of "historical contexts" so frequently imposed on archaeological contexts in the eastern Mediterranean, while Muhly, in reference to the case made for a "Philistine" presence on Cyprus, charged scholars with holding the archaeological evidence hostage to "an often naïve interpretation of a literary text that, at best, is of questionable historical value."[309]

Broodbank ticks off the "trail of mayhem" up and down the Levantine littoral, the sea raids by "flotillas of anonymous enemies" and the attacks on or around Cyprus, summing them up as "a cat's cradle of possibilities" that a century of scholarship has "woven into a narrative of invasion and migration by that notorious modern invention: 'The Sea Peoples.'"[310] He presents his own revisionist version of the collapse, an extended account of the politico-economic factors involving a shift from the centrally organized palatial institutions of the Late Bronze Age to locally based, more flexible, freelance trading practices in the early Iron Age.[311] In his Mediterranean Sea–oriented view, with all its maritime ramifications,[312] the mercurial "sea people" who "lived on boats" and staged various raids in different areas of the eastern Mediterranean during the 13th and especially the 12th centuries B.C.E. stood in opposition to land-based authorities, had few if any definable ethnic or home-port affiliations, represented

306 Hitchcock and Maeir 2014, 632–34.

307 Singer 2013, 328–30. Hitchcock and Maeir (2014, 632, 634) make a similar argument.

308 Knapp 2014.

309 Muhly 1984, 55; Bunimovitz 1995, 328.

310 Broodbank 2013, 460–72.

311 As developed, in different ways, by Artzy 1997, 1998; Sherratt 1998, 2003; Monroe 2009, 2011.

312 Followed in large part in Hitchcock and Maeir 2014.

a harbinger of the smaller-scale political regimes that would come to flourish in certain regions during the Iron Age, and "in all their various guises were in essence as much a consequence, and manifestation, as a root cause of this profound change."[313] Even if this version of events at the end of the Late Bronze Age offers a plausible alternative view, there is no denying (nor does Broodbank seek to do so) the reality of violence, destructions, dislocation/mobility of people, and the demise of multiple, centrally organized polities that had perhaps become all too closely interdependent on the continued operation of an elite-dominated, largely agrarian-based system of political, ideological, and economic interaction and exchange.

It is crucial to reemphasize that, even if climatic change (to longer-term arid, unstable, and cooler conditions) was both real and a relevant forcing parameter in the period around the close of the Late Bronze Age in the eastern Mediterranean, the immediate cause of the destructions and collapse was human. Thus, an additional step is required in any narrative or model seeking to frame an explanation of, for example, political destabilization and military breakdown. We view the arguments of Maran (mentioned above) with regard to the Mycenaean kingdoms of the Argolid as an example of a persuasive framing,[314] even if the crucial evidence of rural archaeology is missing. The Late Bronze Age palatial elites who continued endless building on a grand scale, conscripting labor, resources, and soldiers and fighting wars, were year by year undermining the basic agricultural systems and peasant populations of the countryside on which their entire world depended. Thus, they made it vulnerable to any unexpected additional stresses—such as significant negative climatic change—and especially to arid conditions, reducing water availability that was fundamental to crops and livestock production. Maran argues:[315]

> When the final catastrophe occurred, it was probably not so much the destruction of the palaces but of the villages which provoked the swift collapse of the Mycenaean kingdom centred on the Argolid. Abruptly, the provisions and tributes for the palaces came to an end, and the villages, in turn, could not count any more on the support from the centres. The implosion of the political order in the central and powerful Argolid may have triggered armed conflicts, which quickly spread from the Argolid to the surrounding kingdoms and affected more and more parts of the coastal areas of the Aegean.

There is one further observation to be made. Although such climatic evidence as we have (and may hope to expect from better-dated future paleoclimatic work) consistently seems to point to arid conditions in the eastern Mediterranean in the last centuries of the second millennium B.C.E.,[316] Cyprus and parts of the Levant have been mainly dry areas at the best of times throughout the past several thousand years. More arid conditions are unlikely to make these regions attractive for human settlement or agriculture. Why would people from all over the central to eastern Mediterranean want to migrate to the most arid part of the basin (i.e., the standard Sea Peoples narrative)? This might be contrasted, for example, with the early Iron Age (esp. from the eighth century B.C.E.), when moister conditions likely promoted human activities and culture all over the Mediterranean and Eurasia.[317] Inherently this situation suggests we need to look away from any simple or single unified hypothesis to explain the end of the Late Bronze Age and instead develop new localized to regional mechanisms and responses that—only retrospectively—give the appearance of a coherent mosaic narrative.

In such a context the apparent, but not always chronologically precise or secure, evidence of a shift to (overall) drier, cooler, and more unstable climatic conditions in the final centuries of the second millennium B.C.E. in the eastern Mediterranean could plausibly provide a key additional, unanticipated factor that tipped at least some of the palatial societies of the region into (locally varying but generally similar) progressive negative spirals. In turn, these would have led to insecurity, population movement within and then beyond territories, collapse, reorientation and the undermining of wider trade, and thus further collapses and reorientations. The case of the breakdowns and difficulties experienced by the Ottoman empire during the climate challenges of the Little Ice Age

[313] Broodbank 2013, 468.

[314] Maran 2009.

[315] Maran 2009, 255–56.

[316] E.g., the study of Neugebauer et al. (2015), appearing as our article was in press, again indicates arid conditions in the second half of the second millennium B.C.E. (in the southern Levant), and with a better-defined chronology than in much existing work, and so suggests promise for future progress.

[317] Kaniewski et al. 2013, 14 August; Manning 2013, 112–14 (with references).

provides a possible analogue over some of the same geographic area.[318]

CONCLUSIONS

Pirenne long ago postulated that the fall of the Roman empire and the collapse of its urban systems and institutions resulted not from barbarian invasions but rather as a consequence of western Europe's detachment from wealthy Mediterranean trade networks following the Muslim Arab conquests of the seventh century C.E.[319] As the commercial classes disappeared in the wake of this collapse in Mediterranean trade and the wealth that followed in its wake, urban life was abandoned and political institutions fell apart. Many subsequent critiques and revisions of Pirenne's thesis continue to emphasize the importance of trade.[320] In the case of the Late Bronze Age, whatever else happened it would be folly to deny the relevance of a deep-seated decline in international trade.

As to climatic factors, human societies of all kinds and in many different types of environments have shown their resilience to both long- and short-term episodes of climate change. In most cases, collapse results from multiple, "cascading" stress factors—politico-economic, demographic, and sociocultural as well as environmental—and the interrelationships among them.[321] Hassan also stresses relational aspects, arguing that factors such as structural deficits, inherent social antagonisms, and political dynamics made complex societies vulnerable to extreme climate events.[322] Thus, climatic fluctuations or alterations served as catalysts rather than unique triggers for the demise of social systems. At the same time, however, the magnitude of climatic factors may be such that some societies—if not entire civilizations—succumb to them and become transformed dramatically or collapse altogether.[323] In the present case, we are certainly dealing with transformation(s), but scholars continue to debate the extent to which the "collapse"—or better, decline, with clear cultural continuity in many places—was either (1) linked to climatic changes or (2) interconnected throughout the eastern Mediterranean. Based on a series of proxy indicators, there is clearly some sort of shift to cooler and more arid and unstable conditions generally between the 13th and 10th centuries B.C.E., but not necessarily any one key "episode"; thus, there is a context for change but not necessarily its only or specific cause. In our view, it remains highly problematic to distinguish proximate from ultimate cause, or causes.

Taking into account the many perspectives that emerge from analyzing the documentary, material, climatic, and chronological evidence presented in this article, and the ways in which they may support, contradict, or balance one another, it seems to us that we have reached a point where we have taken this essentially prehistoric scenario as far as we can. Indeed, one elite group of archaeologists, radiocarbon specialists, earth scientists, and paleoclimatologists examining the impact of "rapid climate change" on prehistoric societies in the eastern Mediterranean during the Holocene, including the period between 1100 and 900 B.C.E. with Troy as a case study, concludes in exasperation:[324]

> Altogether, there is so much evidence for internecine warfare, cultural collapse, human migration, social disruption, and the supra-regional catastrophic impact of earthquakes, all operating between 1250 and 1100 histBC, that we have no need for climate deterioration, on top of all this, to further complicate our understanding of these complex processes.

Although numerous sites were destroyed or abandoned over an indeterminable but relatively short period of time, we cannot ascertain exactly who the agents of destruction were in each case (Sea Peoples, Egyptians, Israelites, Aramaeans, Dorians, pirates more generally). The point is that a large number of sites were destroyed or abandoned within a couple of generations, and many of them never again regained any level of economic or political significance. The stratigraphic details at some sites are contested, some more bitterly than others, but the aftermath is also clear: the material, monarchical, and maritime landscapes of the 11th to 10th centuries B.C.E. are very different from those of the 13th to 12th centuries B.C.E.

The documentary evidence discussed in this study[325] is remarkably informative, and it has been treated with exceptional attention to detail: compared with evidence from any earlier period, there are an unusual number of references to grain shipments, food shortages, and possible famine. True, we cannot put

[318] White 2011.
[319] Pirenne 1925, 1939.
[320] Discussed in Schwartz and Nichols 2006, 8; cf. McCormick 2001.
[321] Butzer 2012; Butzer and Enfield 2012.
[322] Hassan 2009.
[323] Cooper and Sheets 2012.
[324] Weninger et al. 2009, 44.
[325] As well as in Cline 2014.

all of these documents into a satisfactorily intelligible chronological sequence, but many of them derive from the 13th to 12th centuries B.C.E., indicating that there were indeed climatic perturbances at the end of the Late Bronze Age. All the climatic studies presented here may be flawed, each in their own way, but they all come to more or less the same conclusion: an increasing level of aridity during the 13th to 10th centuries B.C.E. It is remarkable that we know as much as we do about what may have happened ca. 1200 B.C.E., the result of generations of dedicated archaeological and textual research, more recently supplemented by interdisciplinary paleoclimatic and chronological efforts.

The cultural and economic demise that we witness in all this was, of course, the consequence of human actions and reactions. Whether we view the purported evidence of a grain shortage as a sign of troubled times and/or climatic deterioration or as "an index of robust precocity" in the practice of shipping grain from bountiful lands like Egypt in bulk over ever-longer distances[326] simply depends on the arguments one is attempting to make. The long-standing narrative of invasion and large-scale migration(s) by the Sea Peoples can no longer stand on its own, if ever it could, and in this we are in accord with Cline's conclusions. However, this traditional view in its many permutations cannot simply be replaced by an earthquake storm or a climate that was, according to many reconstructions, becoming drier (or, contradictorily, either cooler or hotter) than it had been for nearly a millennium. Exactly what precipitated the intensifying mobility of so many different peoples seems impossible to determine except on a case-by-case basis. Nonetheless, the topic of ethnicity has preoccupied a variety of scholars so different in their training and orientation(s) that we need not expect any coherence in this realm, either. The most we can say is that the frequency, as well as the diversity and intensity, of such "ethnic" movements becomes much more visible and commonplace than it ever had before.

What the Mediterranean Sea had brought together it could also render asunder, and the sailing ships that are now visible everywhere—from depictions on pottery vessels to the graffiti on "temple" walls to citations in documentary records, and increasingly beneath the sea itself—certainly aided and abetted these demographic movements. All this resulted in bafflement if not impotence on the part of prominent, land-based polities against people whose life revolved around "the ungovernable realm of the sea."[327] Despite what appear to be the intimate economic interconnections of these polities, when troubles arose beyond the extent of their influence or control, they were unable to present a united front and so to respond effectively against any perceived enemy or catastrophe.

In Broodbank's opinion, it behooves us to set aside the "rhetoric of collapse" and instead think of the disasters in the palatial regimes as "problem-solving and enabling moments" for certain peoples, as "the birth pangs of a new social and economic order."[328] Many areas of the Mediterranean—the central Mediterranean, most of the Cyclades, the central Levant—seem to have been more resilient or were little affected by destructions.[329] Indeed, certain lands (e.g., Cyprus, several Levantine coastal towns—Phoenician as well as Philistine, even Cilicia and Crete to some extent) survived or even flourished,[330] enabling new sociopolitical regimes and realities that rebounded from the crisis. Even those areas that suffered most (the Aegean, Egypt, Hittite Anatolia) eventually reemerged with new economic and political agendas that flourished, each in their own way, during the Iron Age. Nonetheless, the "crisis" at the end of the Late Bronze Age witnessed various crucial social and cultural realities—the violence and dislocation of people, economic chaos and decline, the increasing mobility of indeterminable ethnic groups (some specifically named but seldom rigorously identified), the largely seaborne nature of most episodes—that will continue to demand archaeological, historical, and scientific attention and interpretation, but not necessarily a final solution.

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[326] Broodbank 2013, 461.

[327] Broodbank 2013, 464.

[328] Broodbank 2013, 468.

[329] Broodbank 2013, 473.

[330] Note, e.g., the three- to fourfold increase in grain-storage capacity at Ayia Triada on Crete (Privitera 2014, 443).

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